Benthic Fauna from Great Lakes Institute Cruises on Lake Huron and Georgian Bay 1963 and 1964

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1986

by

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ABSTRACT

Barton, D. R. 1986. Benthic fauna from Great Lakes Institute cruises on Lake Huron and Georgian Bay, 1963 and 1964. Can. Tech. Rep. Fish. Aquat. Sci., 1487. i-v + 67pp.

Data from several cruises on Lake Huron and Georgian Bay collected by the Great Lakes Institute (University of Toronto) during 1963 and 1964 were examined. Counts of the major groups of organisms recorded on index cards by the original collectors were compared to the contents of the preserved samples. No discrepancies were detected for the Amphipoda and Mollusca, but about 5 percent of the card and sample counts for the Oligochaeta and Chironomidae differed substantially. The distribution of animals by depth and region were consistent when the data from monthly cruises were treated as replicates to calculate yearly station means. Only Pontoporeia was common enough to detect seasonal trends, increasing in May through July, then declining.

Most invertebrate groups were most abundant at depths between 20-50 m. Chironomids other than Heterotrissocladius oliveri were more common nearshore, at depths less than 30 m. Mean abundance and spatial distributions of benthic animals were similar to those reported from other surveys on Lake Huron, but larger numbers of organisms were collected at depths between 20-50 m on the G.L.I. cruises. Standing stocks were much lower in Georgian Bay, especially in the western part of the basin.

RESUME

Barton, D. R. 1986. Benthic fauna from Great Lakes Institute cruises on Lake Huron and Georgian Bay, 1963 and 1964. Can. Tech. Rep. Fish. Aquat. Sci. 1487. i-v + 67pp.

Les données recueillies au cours de plusieurs missions entreprises par l'Institut des Grands Lacs (Université de Toronto) en 1963 et 1964, sur le lac Huron et dans la baie Georgienne sont examinées. Le dénombrement des principaux groupes d'organismes consigné sur fiche à la suite des prélèvements initiaux a été comparé au contenu des échantillons qui ont été conservés. Pour les populations d'amphipodes et de mollusques, le dénombrement des échatillons concordait parfaitement avec les résultats sur fiche tandis que pour environ 5 p. 100 des oligochètes et des chironomides les résultats accusaient un écart considérable. Les données sur la distribution des organismes en fonction de la profondeur et de la répartition par zone se sont avérées exactes dans la mesure où l'on a pu calculer les moyennes annuelles par station en traitant les données recueillies au cours des missions mensuelles comme s'il s'agissait d'échantillons répétés.

La plupart des groupes d'invertébrés étaient abondants dans l'intervalle de profondeurs de 20 m à 50 m. Les chironomides autres que les Heterotrissocladius oliveri étaient plus répandus près des rives, à une profondeur de moins de 30 m. L'abondance moyenne et la répartition dans l'espace de la faune benthique correspondaient aux résultats signalés dans d'autres études sur le lac Huron bien qu'un plus grand nombre d'organismes ait été recueilli à des profondeurs variant entre 20 m et 50 m au cours des missions de l'Institut des Grands Lacs. La biomasse était nettement plus restreinte dans la baie Georgienne, notamment dans la partie ouest.

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BENTHIC FAUNA FROM GREAT LAKES INSTITUTE CRUISES ON LAKE HURON AND GEORGIAN BAY, 1963 and 1964

INTRODUCTION

From 1960 through 1970, a large number of cruises on the Great Lakes were undertaken by the Great Lakes Institute (GLI) of the University of Toronto. The kinds of limnological and biological data collected have been summarized by Rodgers (1972). With the exception of the report by Brinkhurst et al. (1968), none of the data on benthic invertebrates appear to have been published in a form accessible to the research community. Counts of major groups of organisms and some taxonomic information were recorded on index cards for each sample by Dr. F. Ide and assistants. These cards and many of the original samples of animals are now at Canada Centre for Inland Waters.

The GLI surveys include some of the most extensive collections ever made from the open waters of the Great Lakes. Unfortunately, only a single sample was collected at each station visited and the samples were held for varying periods of time in a coldroom before being sieved (0.5 to 0.59mm mesh) and preserved. Thus, individual samples, or even single cruises, may not be very informative.

This study was undertaken to assess the quality of information available from cruises on Lake Huron and Georgian Bay in 1963 and 1964. These cruises were chosen since they were relatively complete in terms of coverage of the lakes and seasons (May to November), and should be comparable with the surveys of Teter (1960), Schuytema and Powers (1966) and Shrivistava (1974). Cruises H-63-2, -5, -7, -9, -12, -13, -14; H-64-1, -4, -6, -8, -10, -11; GB-63-2, -4;

GB-64-4, -5, -7, -8, -9, -10, and -11 will be considered in this report. Vials from those cruises examined by Brinkhurst et al. (1968) were not examined in this report, as samples of the oligochaetes and chironomids were previously removed from the vials.

METHODS

The original data records consist of a series of cards, one per station per cruise, listing counts of Amphipoda (by species), other Crustacea, Oligochaeta, Chironomidae, Bivalvia (by genus), Gastropoda (by species) and other groups (Nematoda, Turbellaria, etc.). Other notations included the date of sampling, station depth, nature of the sediments and other debris brought up by the Franklin-Anderson grab ($0.028 m^2$).

These cards were used to compile summary sheets for each cruise after standardizing the station numbers using the designations of cruises 63-2 for both Lake Huron and Georgian Bay (Figs. 1 and 2). The summary sheets listed the depth, type of substratum, and counts of Pontoporeia hoyi, Oligochaeta, Chironomidae, Pisidium, Nematoda, Turbellaria, other Crustacea, Gastropoda and other invertebrates. Of these, the first four groups contained over 95 percent of all organisms, the others being too poorly represented for meaningful analyses.

A total of 594 of the samples collected during the cruises on Lake Huron in 1963 and 1964 were available, and the Oligochaeta and Chironomidae in them were examined in detail. Other groups had been identified to the lowest practical taxonomic level on the original data cards. Oligochaetes and chironomids were counted and the counts checked against the cards. In most cases Stylodrilus heringianus and Spirosperma ferox were recognizable under a

dissecting microscope; all other worms, as well as chironomids, were mounted in ACS mountant (Hopkin & Williams, England) and identified following Brinkhurst (1986), Jackson (1977), and Saether (1973; 1975a,b; 1977).

Counts were $\log_{10}$ transformed before calculating means ($\pm$95 percent confidence limits) for each of the common groups or species by cruise, year or 10m depth interval. The inefficiency of the Franklin-Anderson grab (Flannagan 1970) was evident in the large variations among most sample counts from the same station on subsequent cruises and stations within the same depth interval.

RESULTS

The first step in the analysis was to examine the reliability of the data cards for Lake Huron by checking them against the actual contents of the preserved samples. It was expected that the numbers of animals might be somewhat lower than indicated on the cards due to loss in handling, poor preservation, or, in the case of Oligochaeta, the inclusion of fragments in the original counts. Amphipoda and Mollusca were identified and counted in 50 randomly selected samples: no discrepancies in the card records were detected. This suggests that the original counts are reliable for these groups.

All samples of oligochaetes and chironomids were identified and counted, then checked against the card counts. Fewer worms were found in the vials than recorded on the cards at four stations in 1963, and at ten stations in 1964. The magnitude of the discrepancies increased with total abundance, so that original counts of more than 20 worms sample^{-1} were sometimes inflated by 25 to 100 percent. These errors did not seem to be systematic and did not

occur in all samples with large numbers of worms. A more serious problem was that the cards listed fewer worms than were found in the vials at 17 stations in 1963 cruises, but none in the 1964 samples. Most of these differences were in samples from cruises H-63-5 and H-63-12. Fewer chironomids were recorded than were found in the vials for six stations from cruises H-63-5 and H-63-12. Samples from ten stations in 1964 had fewer chironomids than had been originally recorded; most of these had large original counts. Only three and two stations had lower sample counts of Oligochaeta or Chironomidae in 1963 and 1964, respectively.

Many of the samples for which discrepancies were detected appeared to be outliers when the original counts for all cruises at a particular station were compared to the card record. That is, the card record was much larger, or smaller than on other cruises in that year. However, this was not always the case, and the variation from cruise to cruise at any given station was often very great.

Seasonal patterns

The only groups that occurred in numbers large enough to detect possible seasonal changes were P. hoyi and Oligochaeta. Sample counts (x) were transformed as log (x+1) and geometric means (±95 percent confidence limits) were calculated for each cruise in Lake Huron and Georgian Bay. The abundance of P. hoyi appeared to increase from May through July in Lake Huron in both years (Fig. 3a). Catches on cruises H-63-2, H-64-8 and, perhaps, H-64-10, H-64-11 were somewhat lower than the general trend. This species was only about half as abundant in Georgian Bay (Fig. 4a) where mean numbers showed no

seasonal pattern. Oligochaetes were also about equally abundant on all cruises in Georgian Bay (Fig. 4b), as was Stylodrilus heringianus, the dominant species in Lake Huron (Fig. 3b). Overall, the correlations between catches of each group at each station in the two years were very low, with $r>0.5$ only for P. hoyi in August (Table 1). Catches on successive cruises were generally more strongly correlated (Table 2) suggesting that some of the apparent differences between years may have been real, though whether this was due to biotic, environmental or sampling differences cannot be assessed. This preliminary examination of the data indicates that single samples, and therefore single cruises, are probably not very reliable, a not very surprising conclusion in view of the normal variability among catches in grab samples. The problem of smaller counts of some groups in the original records from some cruises than in the corresponding preserved sample is more worrisome since the source of these errors is impossible to detect. Discrepancies could arise from counting or recording errors at any stage in the work. With problems of this type, as well as the inefficiency of the grab and the original lack of sample replication, seasonal trends are probably not discernible from the GLI data, except in a very general way as shown for P. hoyi in Lake Huron. It does seem likely, however, that by treating the cruises as replicates and working with yearly station means, some useful information can be extracted. Subsequent analyses were based on this hypothesis. The results are presented by lake.

Lake Huron

The dominant benthic animals in Lake Huron at all depths were P. hoyi, Oligochaeta, Pisidium and Chironomidae (Table 3). P. hoyi was found at all

but 1 and 2 stations in 1963 and 1964, respectively, with the largest numbers (up to 115 sample^{-1}) along the west shore and at the south end of the lake (Fig. 5). Mean numbers station^{-1} were similar in both years (r=0.67). Abundance increased with depth down to about 50m, then decreased sharply to about 5 sample^{-1} at 65m and beyond (Fig. 6). There was a slight suggestion of a secondary peak in abundance at depths of 80 to 100m.

The distribution of oligochaetes was very similar to that of P. hoyi, with the largest numbers of worms occurring near shore (Fig. 7). Abundances of the two groups were strongly correlated (r=0.66 based on yearly station means) in both years. Somewhat larger numbers of worms were collected in 1964, but the correlation among station means between years was high (r=0.71). Oligochaetes were most abundant at depths of 20 to 50m (15 sample^{-1}) (Fig. 8). Numbers declined sharply with increasing depth, reached a minimum at about 80m and remained low at deeper stations in 1963. In 1964, there was a secondary peak of abundance at 80 to 100m, and the few samples from

>180m usually had large numbers of worms.

S. heringianus was the dominant oligochaete at all but 4 and 6 stations in 1963 and 1964, respectively (Fig. 7), and occurred at all but 3 stations in both years. This species appeared to be more abundant in the central portion of the lake in 1964, which accounts for the larger numbers of worms found at depths greater than 80m (Fig. 9).

The second most common oligochaete, Spirosperma ferox, occurred in small numbers throughout the lake and was abundant in Saginaw Bay and along the southwestern shore (Fig. 10). Counts of this species are probably more accurate than for other worms since its thick, opaque cuticle remains easily

recognizable even after the internal tissues have been lost to decay.

Other Oligochaeta identified from the Lake Huron samples included Enchytraeidae, which occurred mainly at offshore stations, Sparganophilus (Glossoscolecidae), Slavina appendiculata (Naididae) and seven species of Tubificidae (Table 4). Immature tubificids without hair setae were found in 51 samples. These and mature Limnodrilus were found most frequently at the southern end of the lake, around Saginaw Bay and near shore from Douglas Point to Manitoulin Island (Fig. 11). Immature tubificids with hair setae were found in 21 samples widely scattered throughout the lake (Fig. 11). The only corresponding mature worms were a single specimen of Tasserkidrilus kessleri and three of Tubifex tubifex. Tubificidae comprised more than 50 percent of the oligochaete fauna at stations 39, 48, 54 and 59 in both years (Fig. 7). Only stations 48 and 59 actually showed signs of eutrophication since total numbers of worms were low at stations 39 and 54. Station 61 supported similar numbers of worms in both years ($\bar{X}$=35.2 and 33.4 sample^{-1} in 1963 and 1964, respectively), of which a slightly higher proportion were S. heringianus in 1963 (56.9 percent) than in 1964 (46.0 percent).

Individuals of Pisidium spp. were found in similar numbers at depths of 10 to 80m in both years, except that catches were anomalously low at 40 to 50m in 1963 (Fig. 12b). These clams appeared to be more widely distributed in 1964, but were most abundant along the central portion of the western shore in both years (Fig. 13). Since it includes several species, little more can be gleaned from the distribution of this taxon.

Chironomidae were represented by 26 identifiable taxa (Table 5), of which Heterotrissocladius oliveri was by far the most common. This species was

found in similar, small numbers throughout the lake in both years, and showed only a slight tendency to be more abundant near shore than in mid-lake (Fig. 14). A congener, H. changi, was represented by three specimens from station 56. All other chironomids occurred only, or were most abundant, at nearshore stations so that total numbers were largest at depths of 10 to 30m and declined steadily to a depth of about 50m (Fig. 12a). Other Chironomidae which were found in more than ten samples were Procladius and Paracladopelma winnelli. Procladius was found in 17 samples, only three of which had more than a single specimen (maximum=3), mainly in Saginaw Bay and at the southern end of the lake (Fig. 15). P. winnelli occurred in similar numbers (1 to 3 sample^{-1}) in 19 samples, mainly along the western shore (Fig. 15). Most other chironomids were found either at the northern or southern ends of the lake (Table 5).

Georgian Bay

Each of the dominant groups in Georgian Bay, P. hoyi, Oligochaeta, Chironomidae and Pisidium spp. (Table 6), tended to be more common and abundant along the eastern side of the bay (Figs. 16-19). Stations in Nottawasaga Bay did not have particularly large standing stocks, but three of the five stations there did yield representatives of all groups. Station 50, near Tobermory and thus probably influenced by water blown in from Lake Huron by westerly winds, had the largest mean numbers of P. hoyi (25.8 sample^{-1}) and Oligochaeta (23.4) of any Georgian Bay station in 1964. The next richest station, #26, yielded an average of 22 P. hoyi and 12 worms. Total standing stocks were generally less than half as large as those recorded in Lake Huron.

Both Chironomidae and Pisidium averaged less than 2.5 individuals sample^{-1} at any station, so little could be seen in their distributions beyond their relative absence from the western half of the Bay (Figs. 18 and 19). Oligochaeta showed a similar distribution (Fig. 17) but were more widespread, with maximum numbers at depths of 20 to 40m and a fairly distinct minimum at 70 to 80m (Fig. 20a). This was very similar to the pattern observed from Lake Huron. Pontoporeia was also most abundant in the northeastern part of the Bay (Fig. 16). The numbers of amphipods in individual samples were extremely variable, especially at stations deeper than 100m. The average abundance at depths of 20 to 50m was about 3.7 sample^{-1}, much fewer than at similar depths in Lake Huron. Minimum numbers occurred at depths of 80 to 100m, about 20m deeper than in Lake Huron.

DISCUSSION

Shrivistava (1974) observed that the order of dominance of major groups in Lake Huron had remained unchanged from Teter's (1960) surveys in 1952 and 1956, but that the relative abundance of Pontoporeia had declined by 1971. The data from the GLI cruises in 1963 and 1964 seem, at first glance, to confirm this trend. The table below summarizes the percentage composition of the benthic fauna found at open-lake sites during various surveys:

Source	Teter (1960)	GLI		Schuytema & Powers(1966)	Shrivistava (1974)
Year	1952/56	1963	1964	1965	1971
Amphipoda	77	61	49	59	38
Oligochaeta	9	30	37	22	33
Chironomidae	3	2	3	3	4
Sphaeriidae	9	5	8	14	22

While these data suggest that the proportion of Amphipoda had declined as the Oligochaeta and Sphaeriidae increased from 1952 to 1971, such changes may simply reflect differences in station location and the season during which the surveys were conducted. Shrivistava's conclusion may have been influenced by his having collected samples only in spring (April and June) when the newly hatched Pontoporeia would be too small to be accurately sampled. Schuytema and Powers sampled in June and August, and Teter sampled in September and October. All of these surveys used similar mesh sizes to separate the animals. Data from the GLI cruises indicate that Pontoporeia may be most abundant in late summer. This species comprised between 46 percent and 49 percent of the fauna during May and June of 1963 and 1964, a level intermediate between that of 1965 and 1971. If we also consider that 25 of Shrivistava's 71 open-lake sampling stations were at depths less than 30m, i.e. shallower than the optimal depth for Pontoporeia, it seems unlikely that the relative abundance of amphipods had changed markedly between 1952 and 1971.

Since the Franklin-Anderson grab has such a reputation for inefficiency in mud (Flannagan 1970, Brinkhurst 1974), a comparison of the mean standing stocks by depth from all available surveys of Lake Huron was something of a surprise (Fig. 21). Substantially larger numbers of animals were collected at depths of 20 to 50m on the GLI cruises. In deeper water the numbers were essentially the same in all surveys, except that Shrivistava (1974) consistently reported somewhat larger values. Macroinvertebrate populations in the deeper water of Lake Huron (beyond 26m) in Teter (1960), Shrivistava (1971) and the GLI cruises averaged 2002 m^{-2}, 1145 (SE=155) and 1190 (SE=80) m^{-2} respectively. Populations in shallow water (<26m) in these three surveys were 625 (Teter); 424, SE=136 (Shrivistava) and 1937, SE=375

(GLI cruises). Each mean plotted in Figure 21 represents a very wide range of values, so few of the differences between years are likely to be real, but more likely reflect differences in season, station location and sampling methods. The larger standing stocks at depths of 20 to 50m in the GLI samples may be due to the somewhat greater efficiency of the Franklin-Anderson over the Ponar grab on sandy substrata (Flannagan 1970).

Quantitative comparisons between the GLI collections and those of Loveridge and Cook (1976) from Georgian Bay are impractical due to the large differences in mesh size used in the two studies (0.5mm versus 0.1mm). The general patterns of abundance among the major benthic groups were very similar between the two series, except that Loveridge and Cook found relatively more oligochaetes in the central portion of the bay. The distribution of the benthic populations in Georgian Bay suggests that much of the organic matter which supports the fauna is allochthonous material from the major inflows into the bay.

CONCLUSIONS

1. The data recorded on index cards for each cruise appear to be accurate for most groups of organisms. Some large counts of worms and chironomids may have been inflated, a few others underestimated, but these were less than 5 percent of the samples. Nearly all of the preserved material is identifiable, though oligochaetes are uncountable in about 20 percent of the samples due to poor preservation.
2. Only the most general seasonal trends are evident in the data. Individual grab samples are normally quite variable and this was reflected in the low correlations among catches between months and years at the same stations.

3. The distributions of animals by depth and area were consistent when cruises were treated as replicates. With only a few exceptions, these patterns were similar in both years.
4. The general picture of the benthic fauna provided by the GLI data was in agreement with the observations of other researchers in terms of the overall composition of benthic communities, but there were some quantitative differences. The larger standing stocks found at depths of 20 to 50m may reflect the greater efficiency of the Franklin-Anderson grab on sandy sediments.
5. This study suggests that the GLI collections are a valuable record of conditions in the Great Lakes during the 1960's and the data should be made available to the research community. Single cruises are probably not very reliable, but the results of repeated cruises appear to be at least as good as any other data available from that time.

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Table 4. Oligochaeta found in samples from GLI cruises of Lake Huron in 1963 and 1964. Cruise, station number, and number of individuals sample^{-1} (in brackets). The station numbers are those shown in Figure 1.

Table 5. Chironomidae found in samples from GLI cruises of Lake Huron in 1963 and 1964. Cruise, station number, and number of individuals sample^{-1} (in brackets). The station numbers are those shown in Figure 1.

Table 6. Percentage contributions of major benthic groups to the total fauna sampled from Georgian Bay in 1964.

Table 1. Coefficients of correlation between catches in 1963 and 1964 during months sampled in both years.

	May	June	July	August	November
Pontoporeia	0.46	0.05	0.29	0.56	0.39
Oligochaeta	0.22	0.24	0.44	0.39	0.30

Table 2. Coefficients of correlation between catches on sequential cruises on Lake Huron.

1963				1964			
Cruise	Month	P. hoyi	Oligochaeta	Cruise	Month	P. hoyi	Oligochaeta
2	May	0.23	0.38	1	April	0.53	0.48
5	June	0.10	0.65	4	June	0.49	0.57
7	July	0.35	0.77	6	July	0.42	0.62
9	Aug.	0.45	0.54	8	Aug.	0.35	0.42
12	Sept.	0.45	0.54	10/11	Nov.	-	-
13/14	Nov.	-	-				

Table 3. Percentage contributions of major benthic groups to the total fauna sampled from Lake Huron in 1963.

Depth	Oligochaeta	P. hoyi	Chironomidae	Pisidium
11-20	8	76	5	7
21-30	42	43	4	8
31-40	24	66	1	8
41-50	37	58	1	3
51-60	27	66	1	2
61-70	32	60	1	2
71-80	29	68	0	2
81-90	27	70	3	0
91-100	19	81	3	0
101-110	16	82	3	0
111-120	30	69	1	0
>121	34	64	1	0
all	30	61	2	5

Table 4. Oligochaeta found in samples from GLI cruises of Lake Huron in 1963 and 1964. Cruise, station number, and number of individuals sample^{-1} (in brackets). The station numbers are those shown in Figure 1.

Glossosscolecidae	
Sparganophilus sp	63-7#56(1); 63-13#45(1); 64-1#39(1)
Lumbriculidae	
Stylodrilus heringianus	See Figure 9
Tubificidae	
Aulodrilus americanus	63-5#56(1); 63-12#1(1),#60(1); 64-8#1(1),#10(1),#59(1)
A. pluriseta	64-8#59(5)
Isochaetides curvisetosus	63-5#56(1)
Limnodrilus hoffmeisteri	63-5#39(1),#48(2),#59(1); 63-7#40(2),#47(1),#48(14),#51(2),#59(2),#61(1), 63-9#48(1); 63-12#22(2); 64-1#48(1),#51(1); 64-4#3(1),#48(4),#49(1); 64-6#22(1),#48(1); 64-8#54(1); 64-10#46(1); 64-11#37(1),#46(1)
L. profundicola	63-5#6(1),#39(3); 63-9#39(1)
immatures w/o hair setae	63-2#22(1); 63-5#22(1),#39(5),#59(2); 63-7#40(1),#48(7),#56(1),#59(1); 63-9#39(1),#48(2),#57(1),#59(2); 63-12#1(3),#11(6),#14(4),#21(3),#22(10),#23(2),#36(1),#44(2); 63-13#48(3); 63-14#57(1);64-1#48(12),#51(2),#54(2), #56(1),#58(1); 64-4#23(3),#39(2),#48(8),#49(2),#54(1); 64-6#7(2),#22(1),#34(1),#39(1),#48(2),#57(1),#59(1); 64-8#15(1),#39(2),340(1),359(1),#61(1); 64-10#61(7); 64-11#22(1),#37(2),#39(3),#40(3),#48(3),#54(2)
Rhyacodrilus coccincus	64-11#4(2)
Spirosperma ferox	See Figure 10
Tasserkidrilus kessleri	64-6#39(1)
Tubifex tubifex	64-11#54(1)
immatures w hair setae	63-5#39(3),#59(4); 63-7#47(3),#54(1),#59(7),#61(7); 63-9#39(1),#48(1); 63-12#1(3),#2(1),#11(7),#14(1),#58(1); 63-13#4(4); 64-1#48(4); 64-4#54(2); 64-6#59(1),#61(1); 64-11#4(2),#48(4)
Enchytraeidae	63-7#43(1); 64-1#34(5); 64-4#37(1),#61(1); 64-6#5(2),#26(1),#28(2); 64-8#11(1),#14(1),#38(2),#39(1); 64-11#27(8)
Naididae	
Slavina appendiculata	63-13#49(1)

Table 5. Chironomidae found in samples from GLI cruises of Lake Huron in 1963 and 1964. Cruise, station number, and number of individuals sample^{-1} (in brackets). The station numbers are those shown in Figure 1.

Ablabesmyia	64-6#49(4)
Procladius	See Figure 15
Thienemannimyia-gp	63-12#13(1)
Protanypus hamiltoni	63-9#15(1); 64-6#10(2)
P. ramosus	64-11#1(1)
Monodiamesa tuberculata	63-5#56(1); 63-12#6(2); 63-14#57(1); 64-11#4(1)
Potthastia gaedi-gp	64-10#49(1),#61(1)
P. longimana-gp	63-12#6(1)
Heterotrissocladius changi	63-11#56(2)
H. oliveri	See Figure 14
Chernovskiia	64-11#59(1)
Chironomus sp A	63-9#48(1)
Chironomus sp B	63-5#32(2); 63-9#59(1)
C. fluviatilis-gp	63-12#6(1)
Cryptochironomus	63-7#49(1); 64-10#49(1); 64-11#56(1)
Demicryptochironomus	63-7#56(3); 64-6#61(1); 64-11#56(1)
Microtendipes	63-7#48(1); 63-9#48(1); 64-6#55(1); 64-11#32(3)
Paracladopelma galaptera	63-7#56(1)
P. winnelli	See Figure 15
Paralauterbourniella	64-6#59(1)
Polypedilum laetum	63-5#48(1); 63-7#16(1),#32(2),#48(1); 64-4#32(1); 64-6#50(1),#59(1)
P. scalaenum	63-5#56(1),#59(1)
Pseudochironomus fulviventris	64-6#55(1)
Stictochironomus	63-5#56(1); 63-7#56(1); 63-14#4(3)
Cladotanytarsus	63-7#56(1); 64-6#55(2),#56(2); 64-11#56(2)
Micropsectra	63-7#48(1),#50(1); 63-9#1(1)
Tanytarsus	63-7#49(1); 63-12#58(2); 63-13#4(1); 64-6#56(1),#59(1); 64-11#56(1)

Table 6. Percentage contributions of major benthic groups to the total fauna sampled from Georgian Bay in 1964.

Depth	Oligochaeta	*P. hoyi*	Chironomidae	*Pisidium*
20-30	26	55	7	8
31-40	35	49	8	5
41-50	52	40	3	3
51-60	30	59	1	2
61-70	14	77	3	2
71-80	25	67	1	0
81-90	41	51	2	2
91-100	34	52	5	0
101	10	86	0	2

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Figure 2. Standardized locations of sampling stations on Georgian Bay in 1963 and 1964.

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Figure 4. Geometric mean numbers sample^{-1} (±95% c.l.) of P. hoyi and total Oligochaeta collected during monthly cruises on Georgian Bay in 1963 (●) and 1964 (▲).

Figure 5. The distribution of P. hoyi ($\bar{X}$ number sample^{-1}) in Lake Huron in 1963 and 1964.

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Figure 7. The distribution of total Oligochaeta ($\bar{X}$ number sample^{-1}) in Lake Huron in 1963 and 1964. Squares indicate stations with more than 50% Tubificidae.

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Figure 12. Geometric mean numbers sample^{-1} (±95% c.l.) of Chironomidae and Pisidium spp. at 10m depth intervals in Lake Huron during 1963 (●) and 1964 (▲).

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Figure 20. Geometric mean numbers sample^{-1} (±95% c.l.) of total Oligochaeta and P. hoyi at 10m depth intervals in Georgian Bay during 1964.

Figure 21. Average total benthic standing stocks at 10m depth intervals in Lake Huron during 1963, 1964 (GLI), 1965 (Schuytema and Powers 1966) and 1971 (Shrivistava 1974).

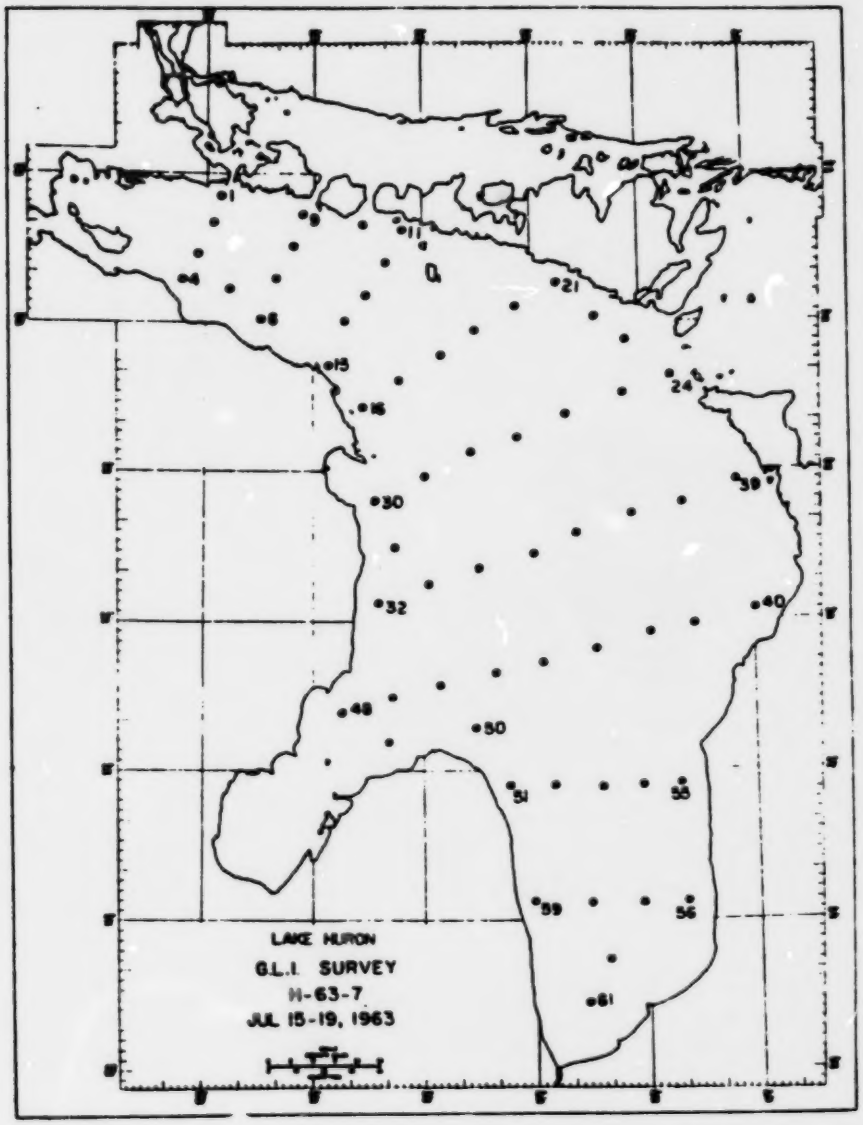


Figure 1. Standardized locations of sampling stations on Lake Huron in 1963 and 1964.

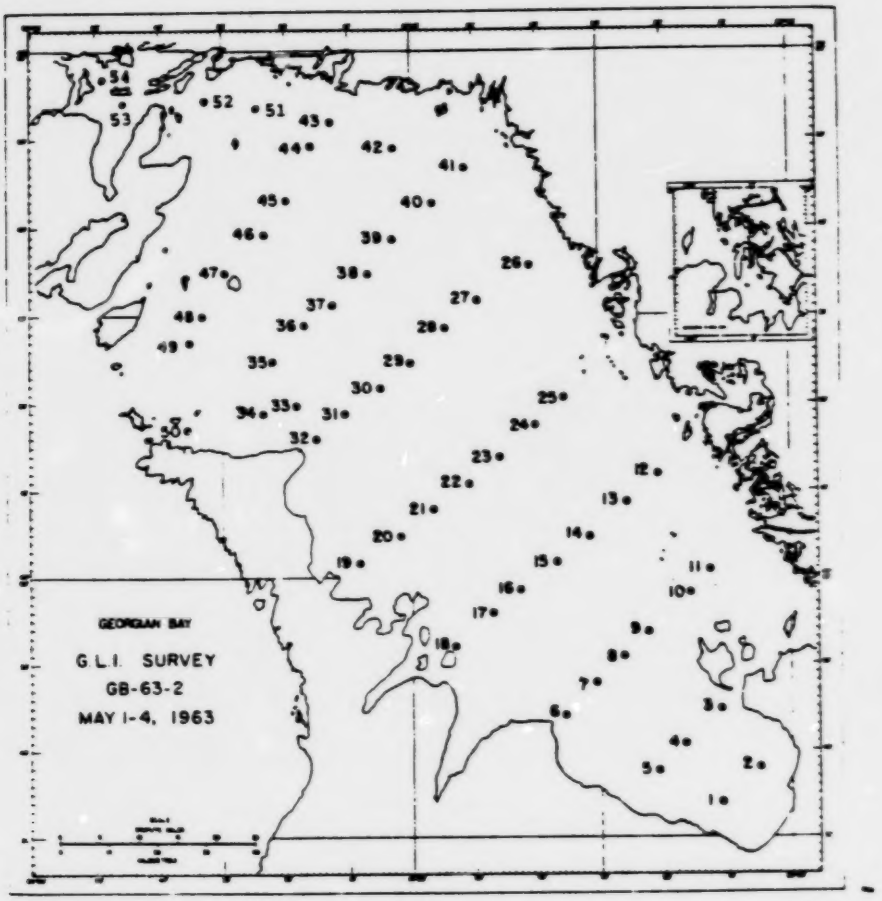
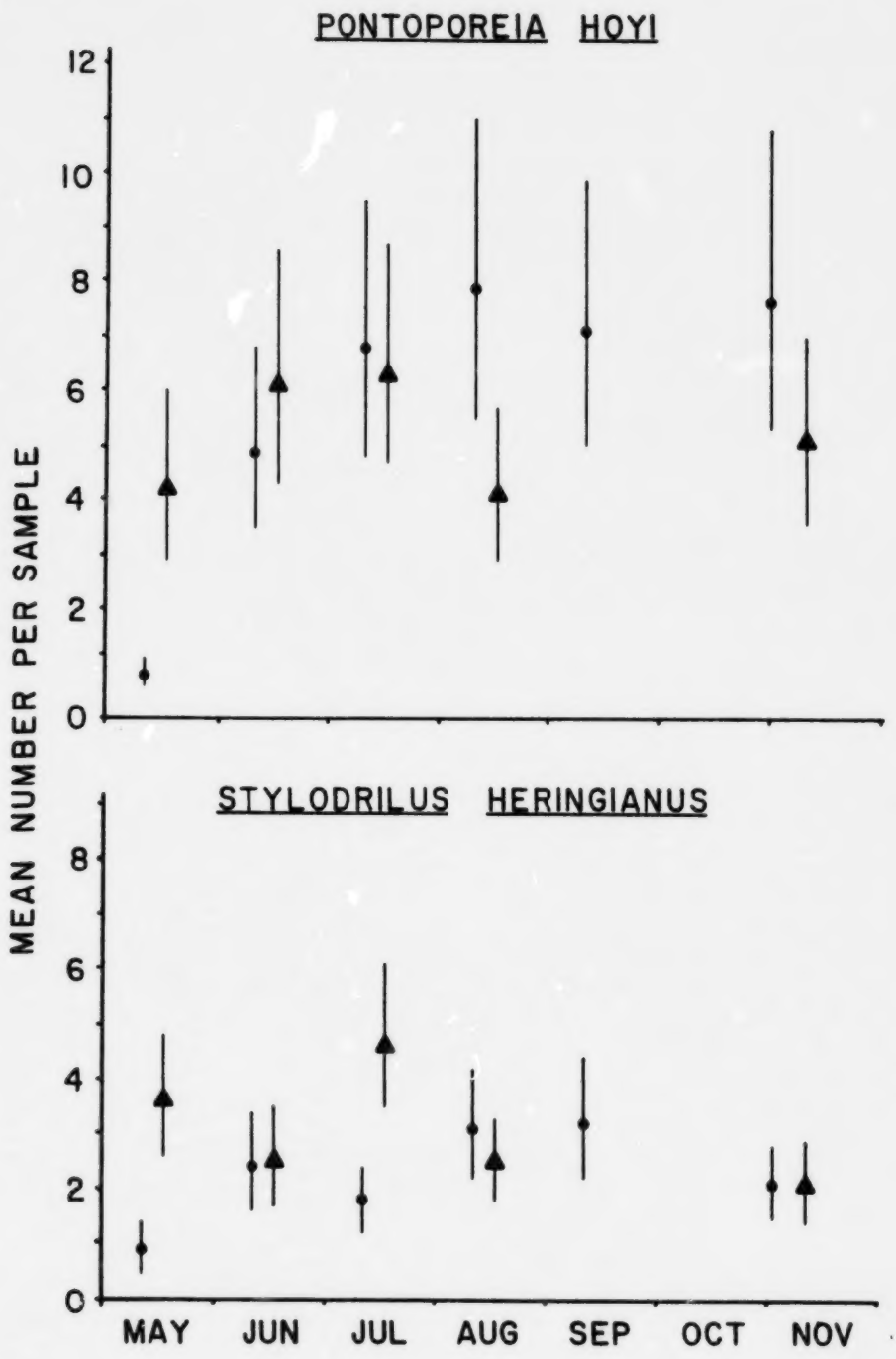


Figure 2. Standardized locations of sampling stations on Georgian Bay in 1963 and 1964.



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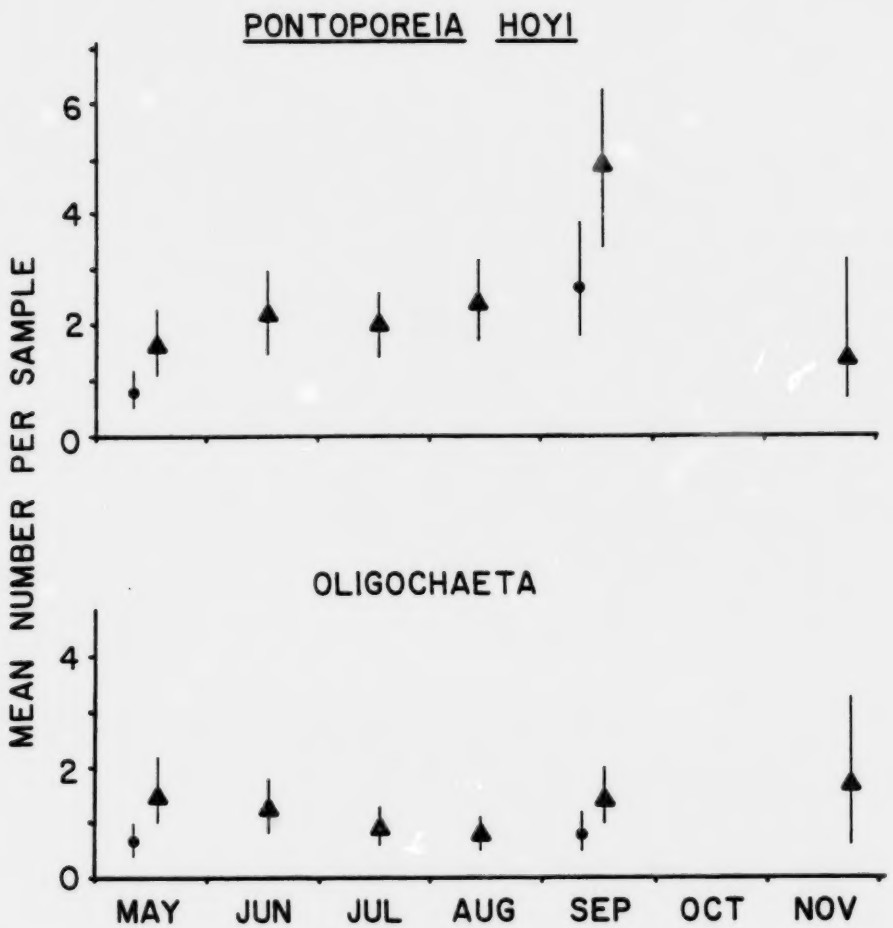

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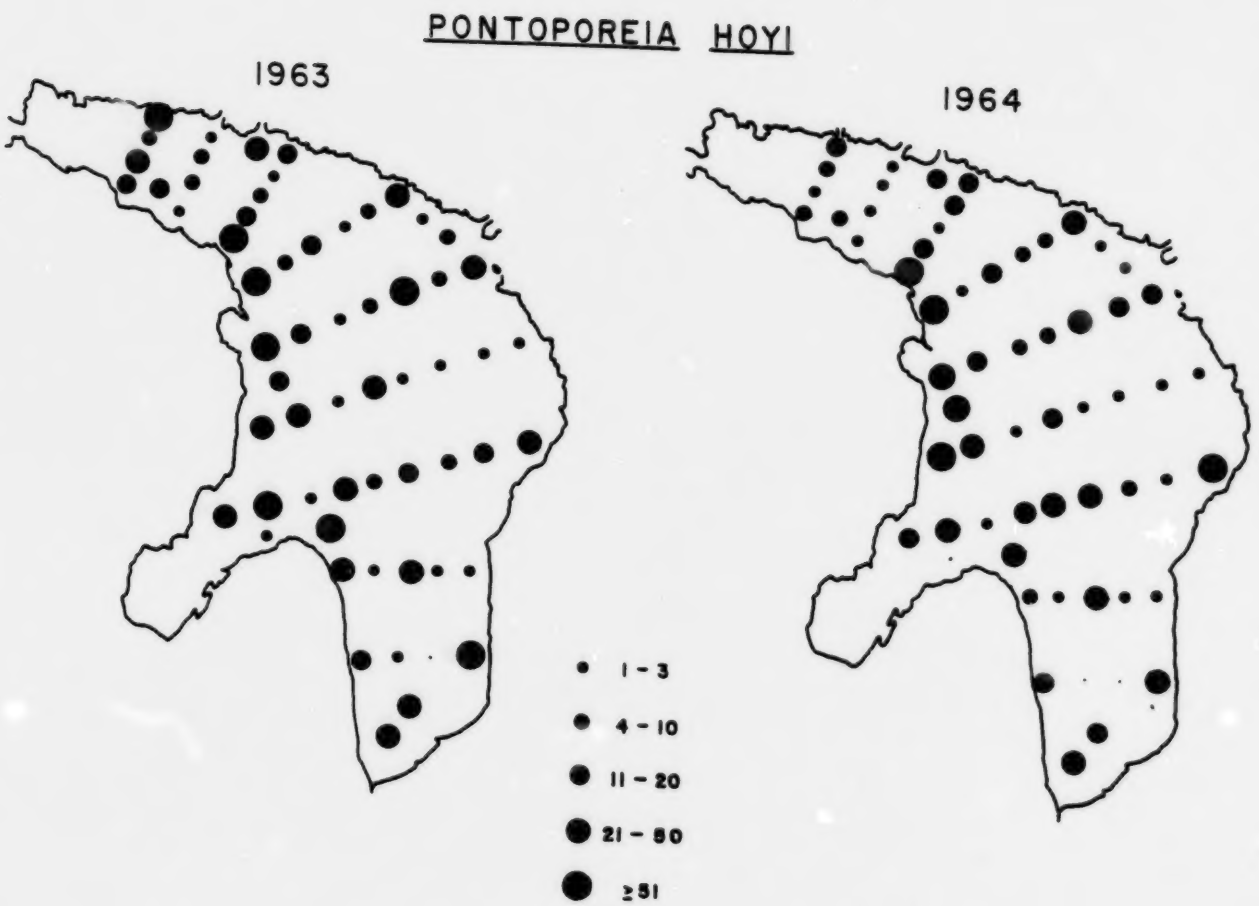


Figure 5. The distribution of P. hoyi ($\bar{x}$ number sample^{-1}) in Lake Huron in 1963 and 1964.

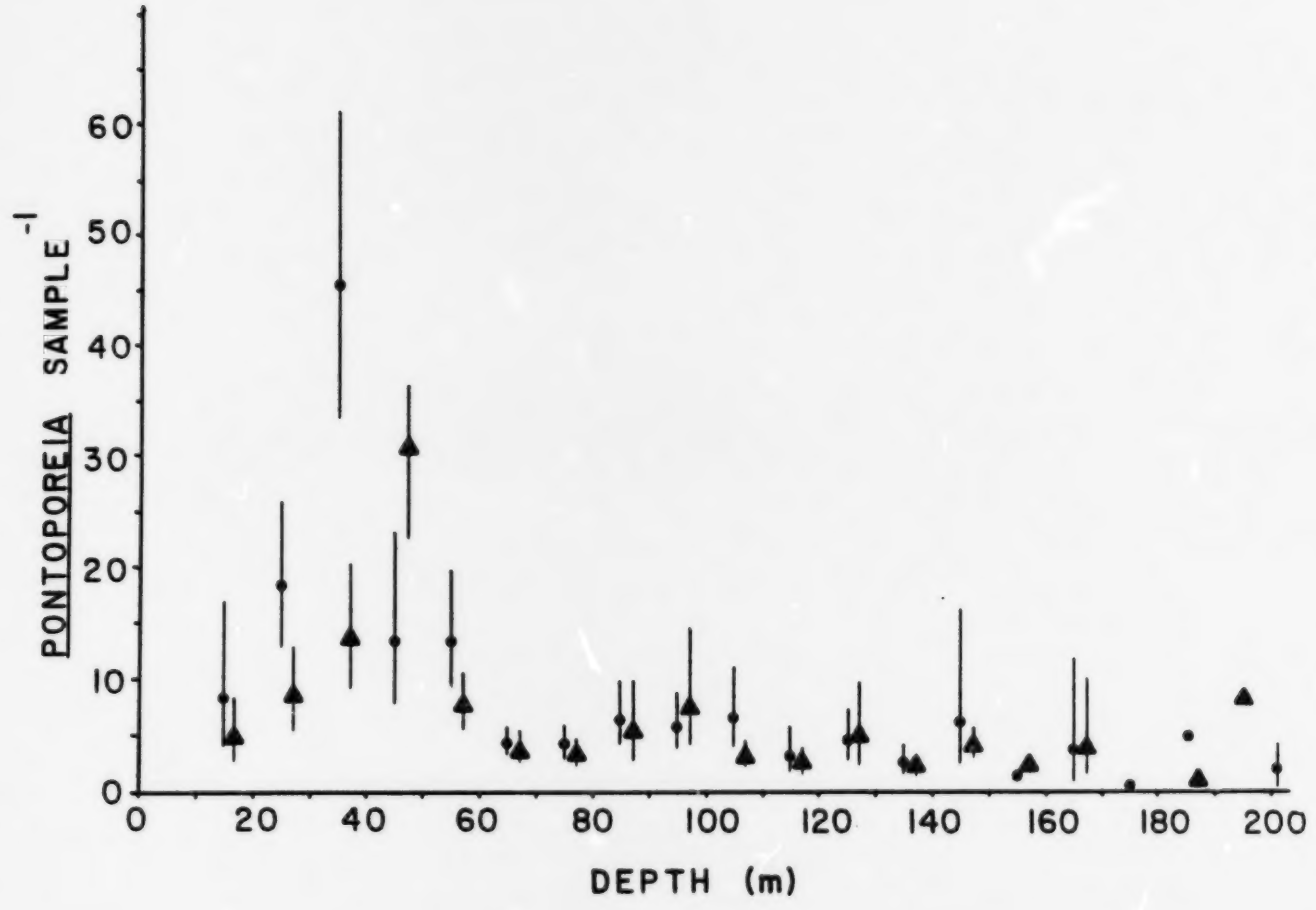
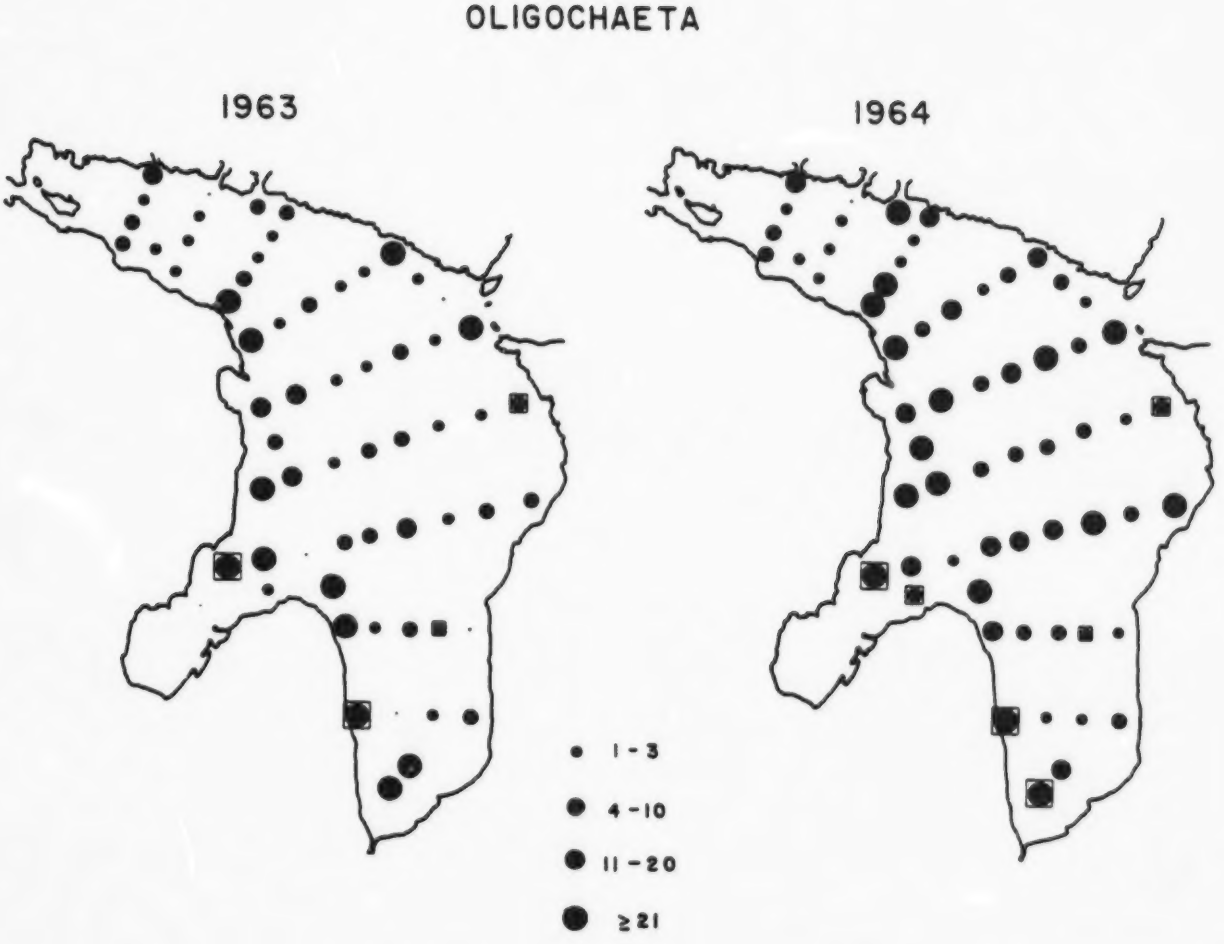


Figure 6. Geometric mean numbers sample^{-1} (±95% c.l.) of P. hoyi at 10m depth intervals in Lake Huron during 1963 (●) and 1964 (▲).



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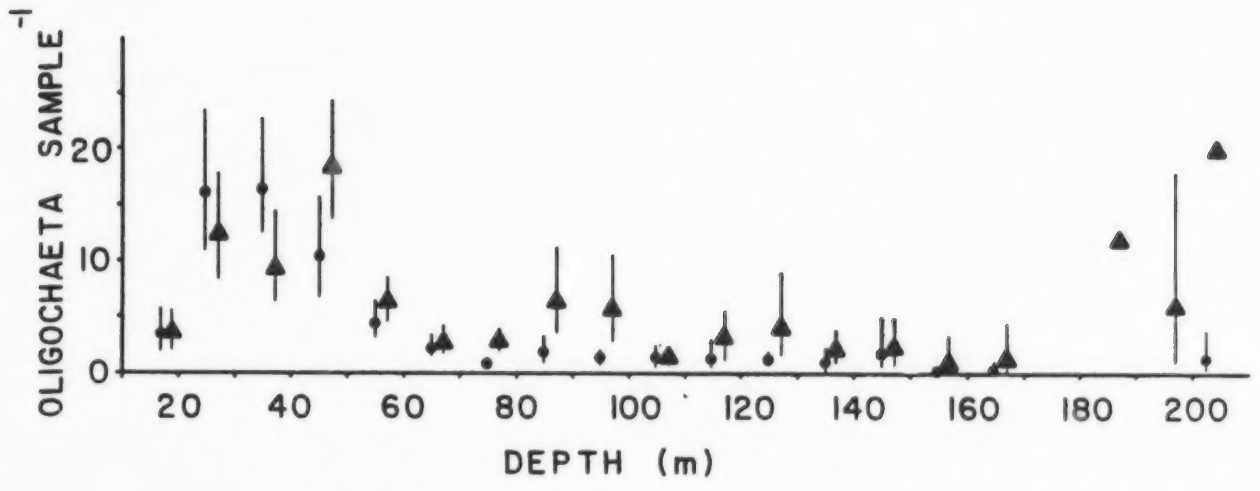

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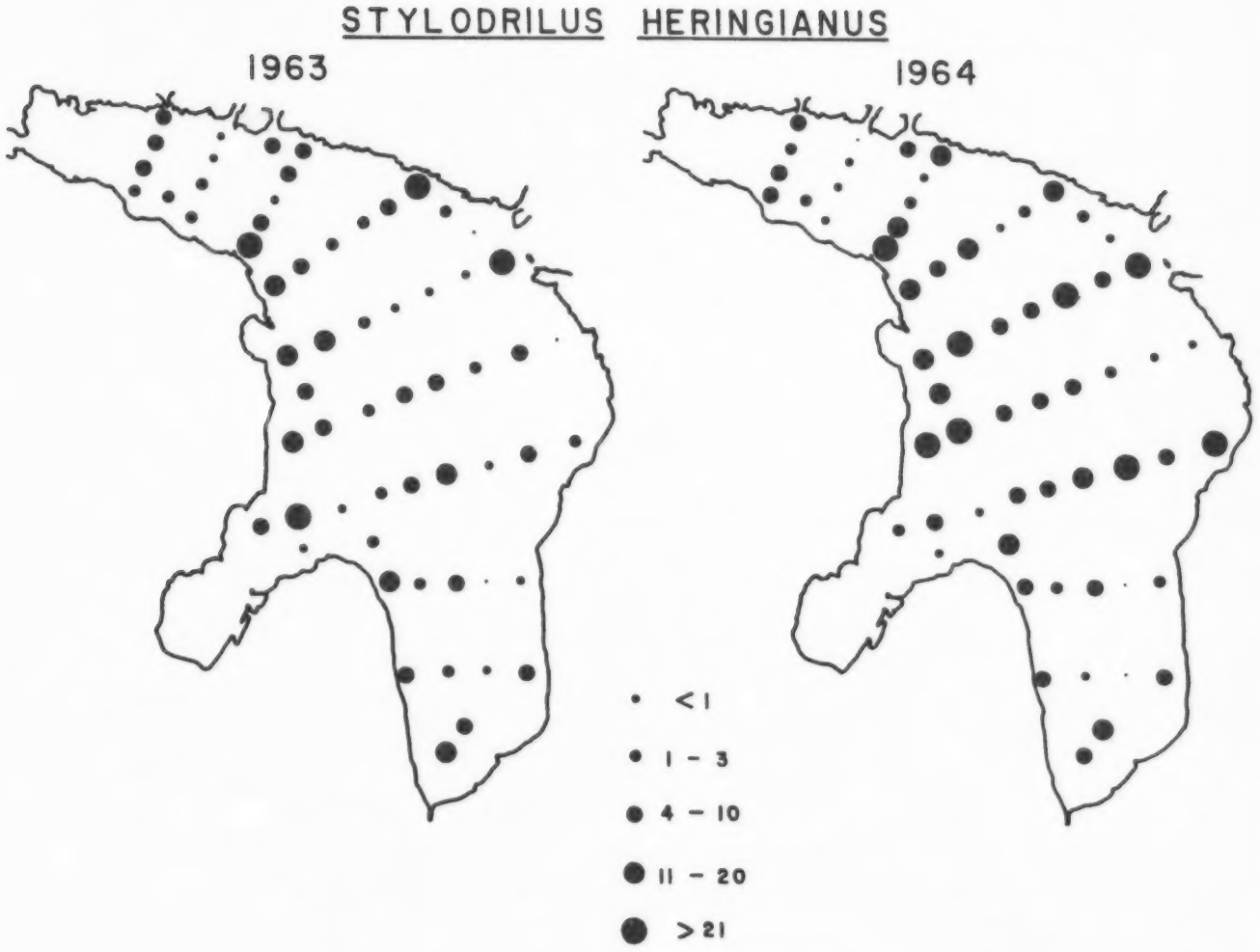


Figure 9. The distribution of S. heringianus ($\bar{X}$ number sample^{-1}) in Lake Huron in 1963 and 1964.

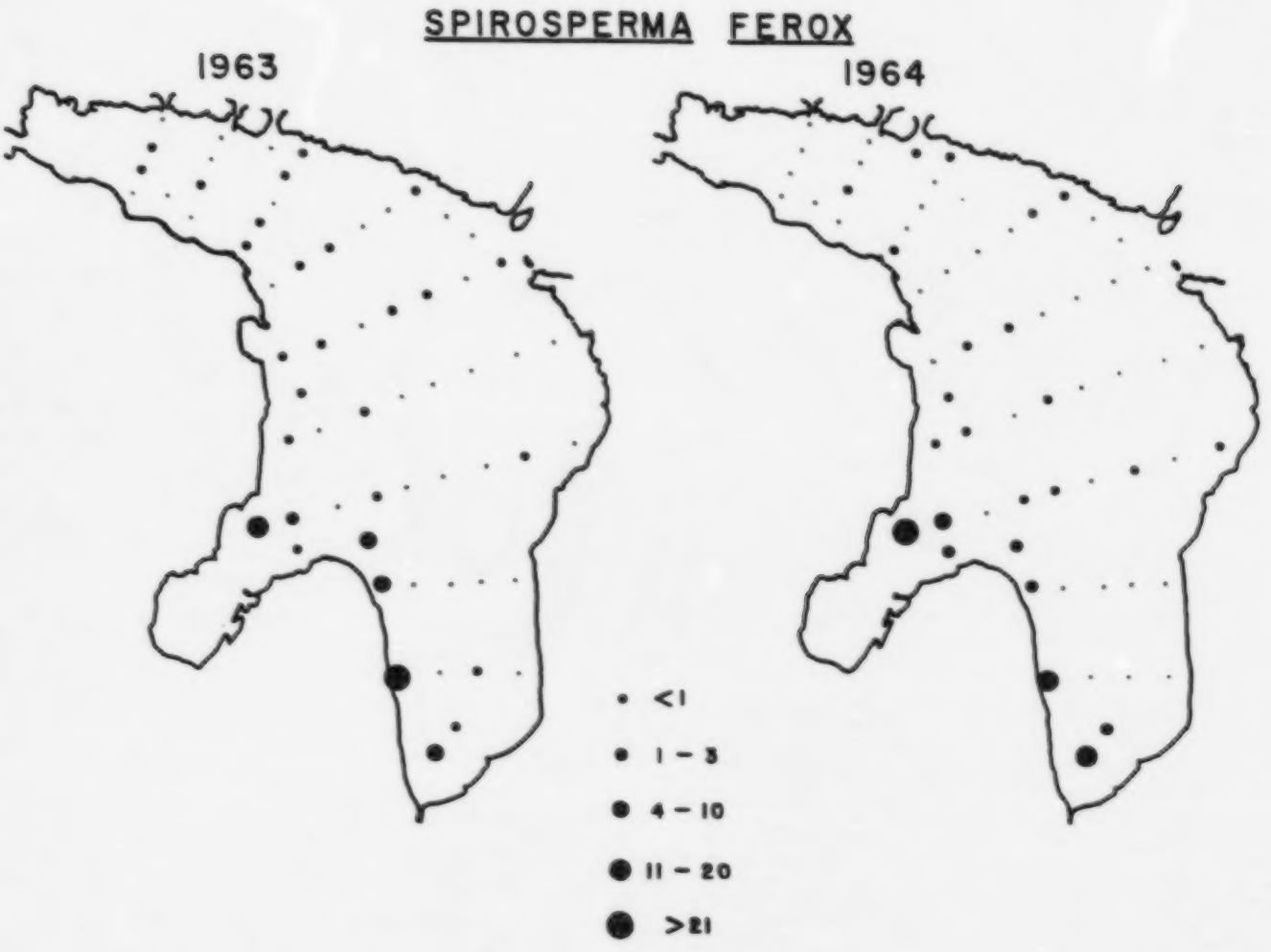
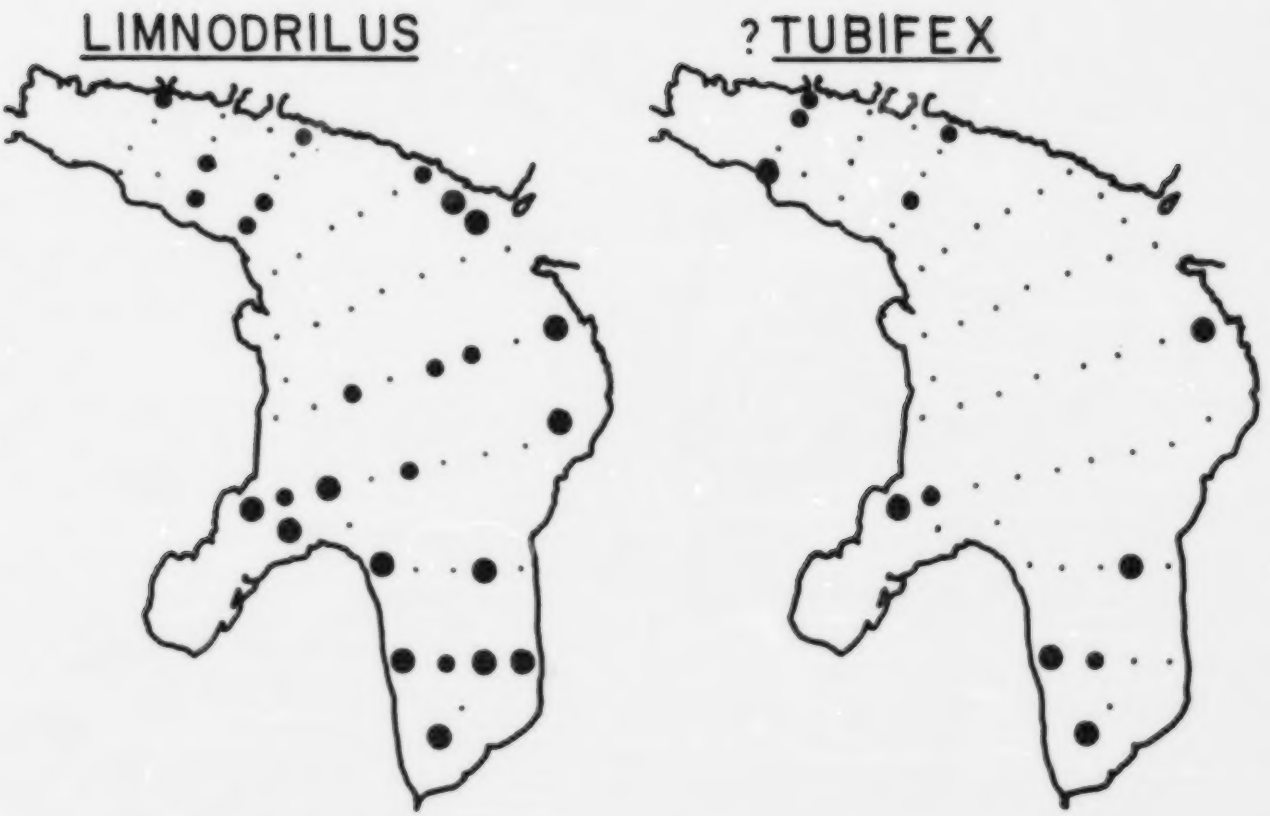


Figure 10. The distribution of S. ferox ($\bar{X}$ number sample^{-1}) in Lake Huron in 1963 and 1964.



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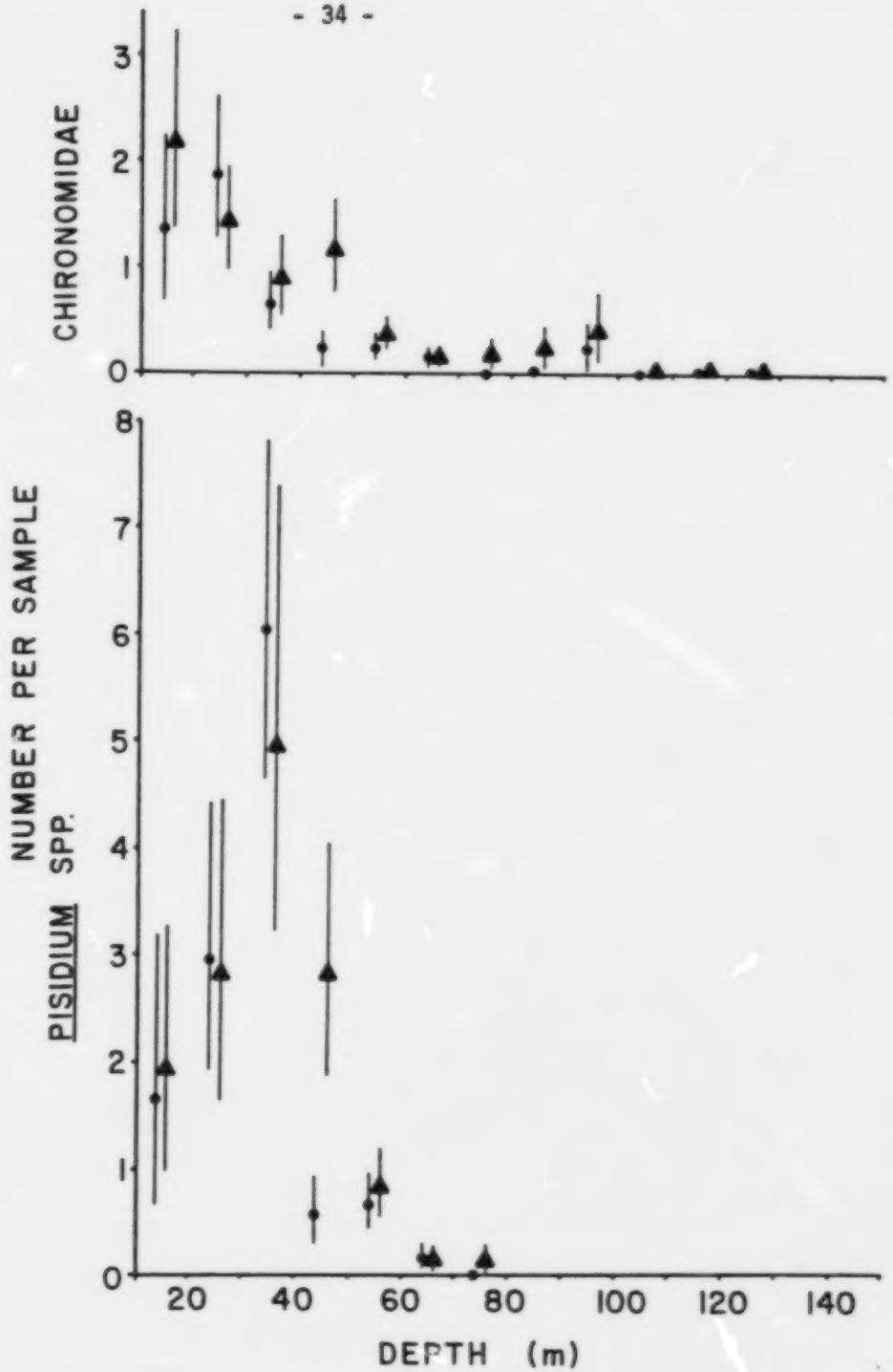

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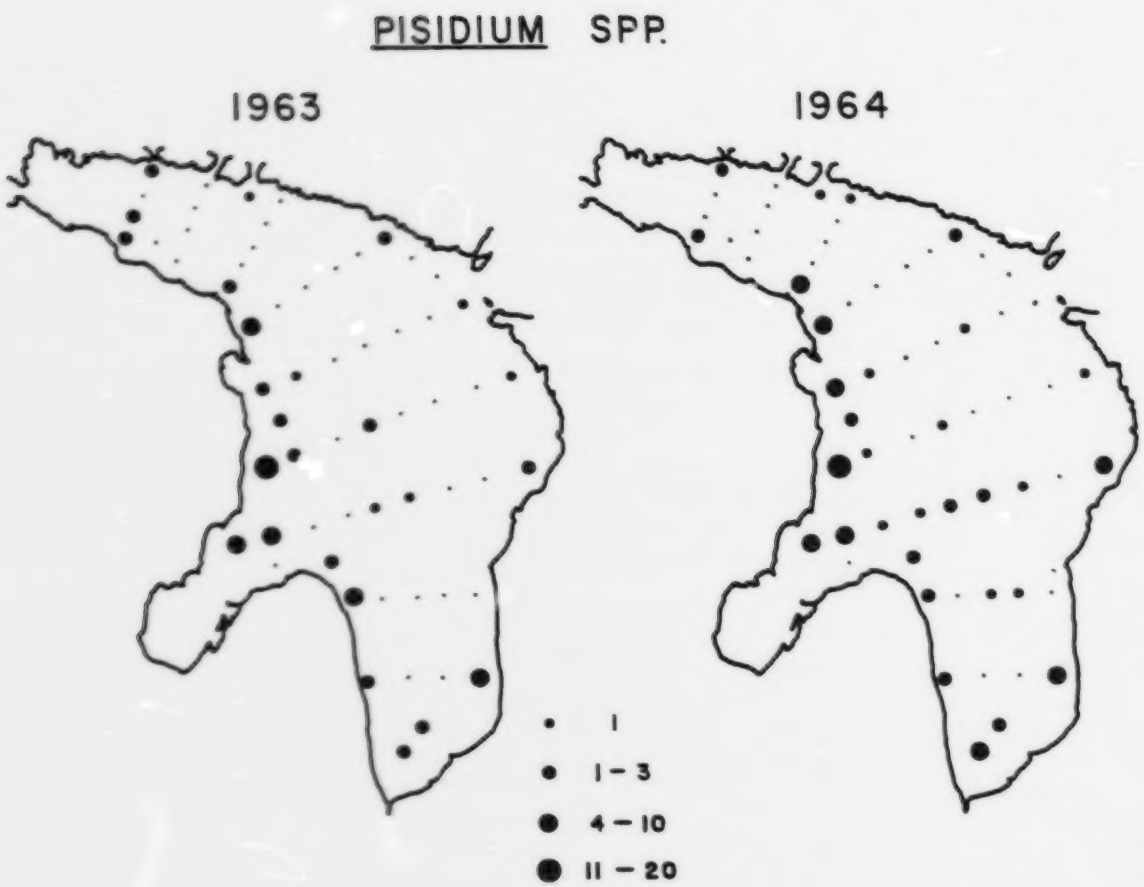

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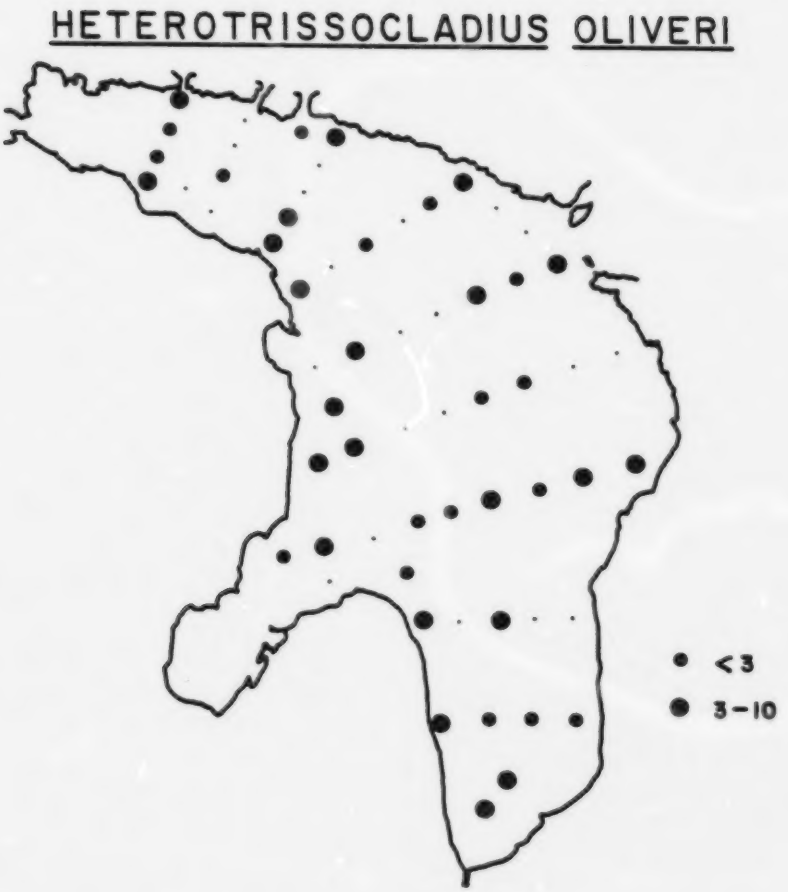
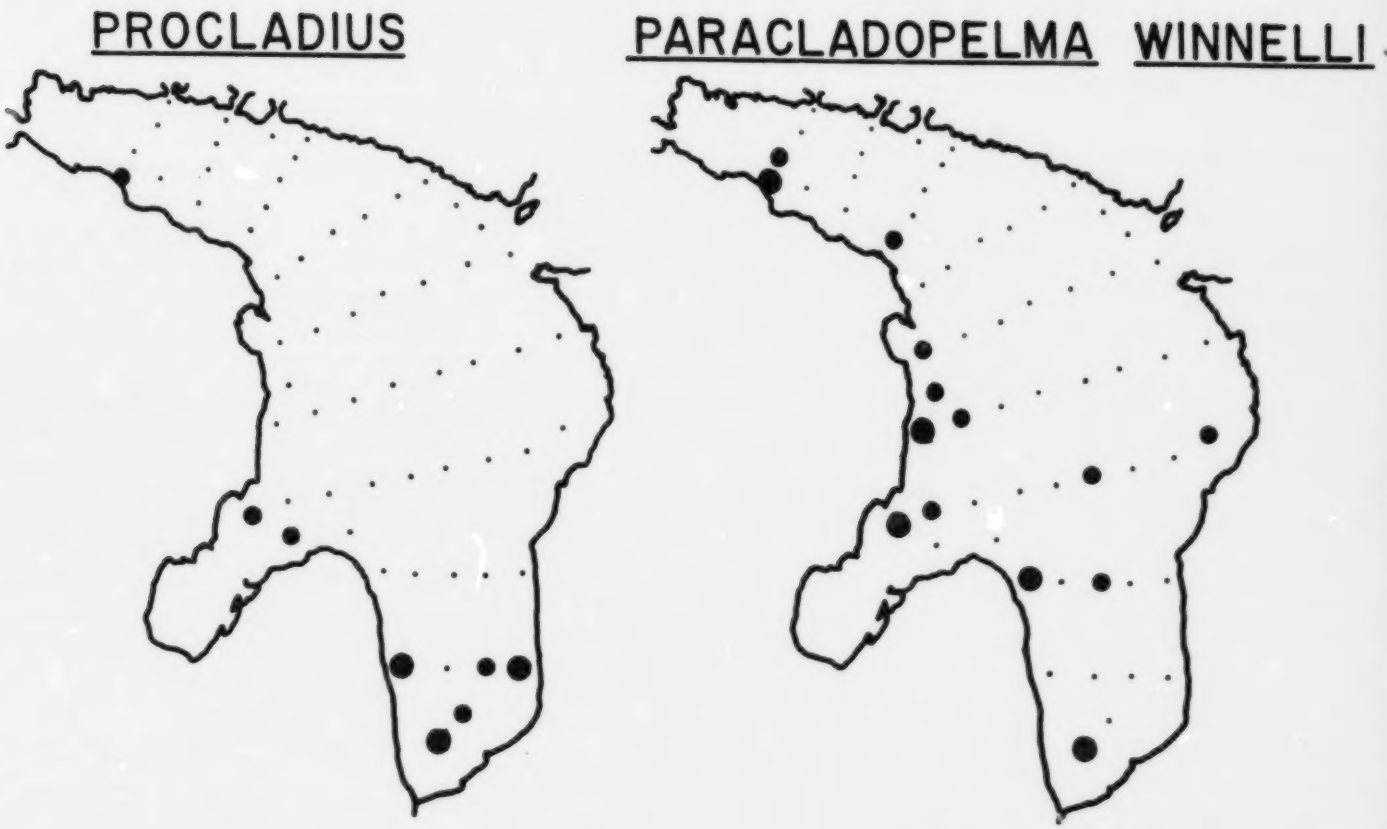


Figure 14. The distribution of H. oliveri ($\bar{X}$ number sample^{-1}) in Lake Huron during 1963 and 1964, combined.



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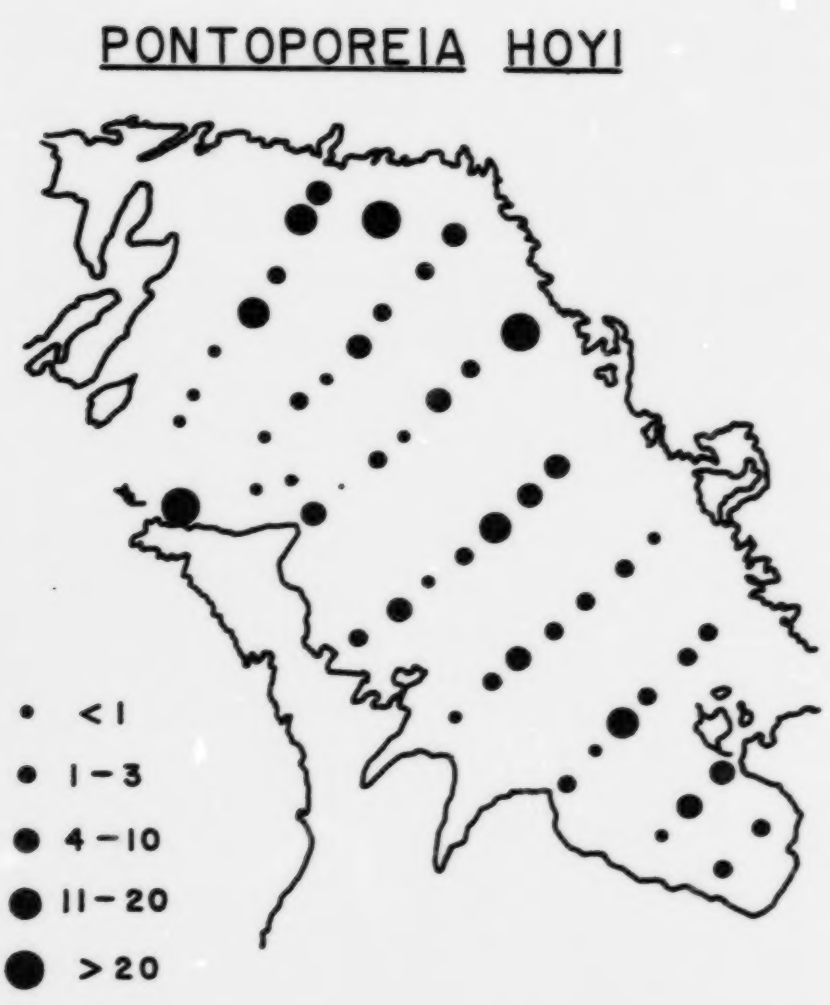

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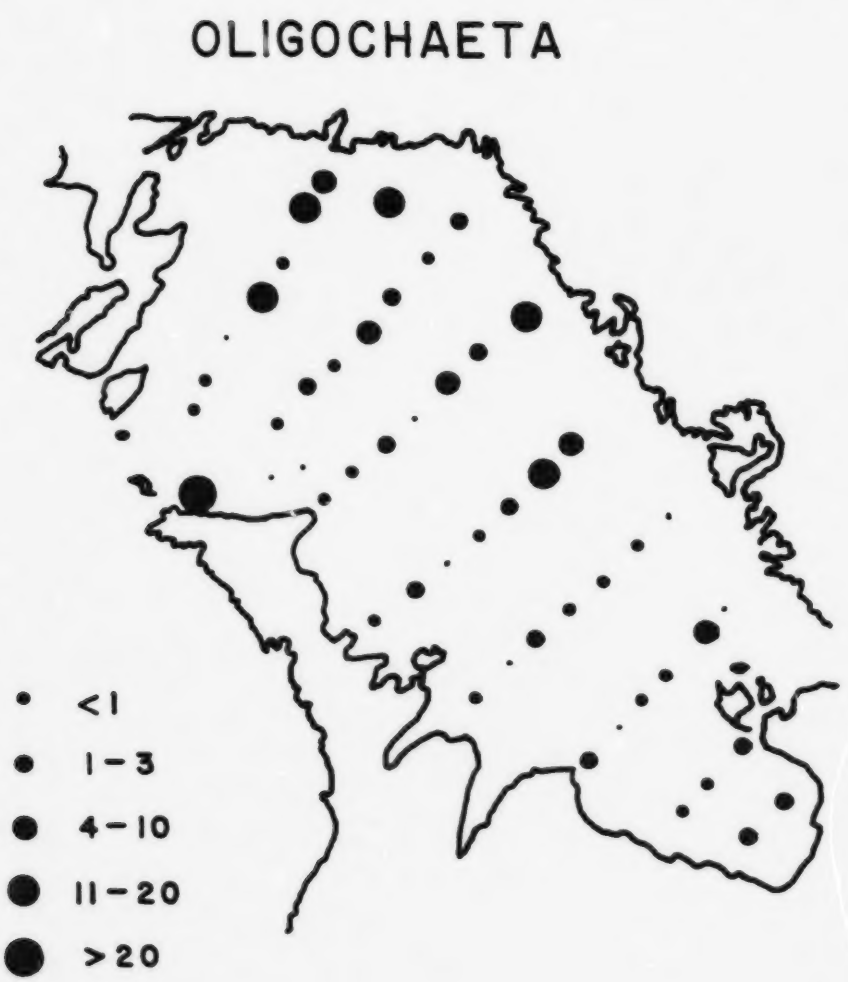

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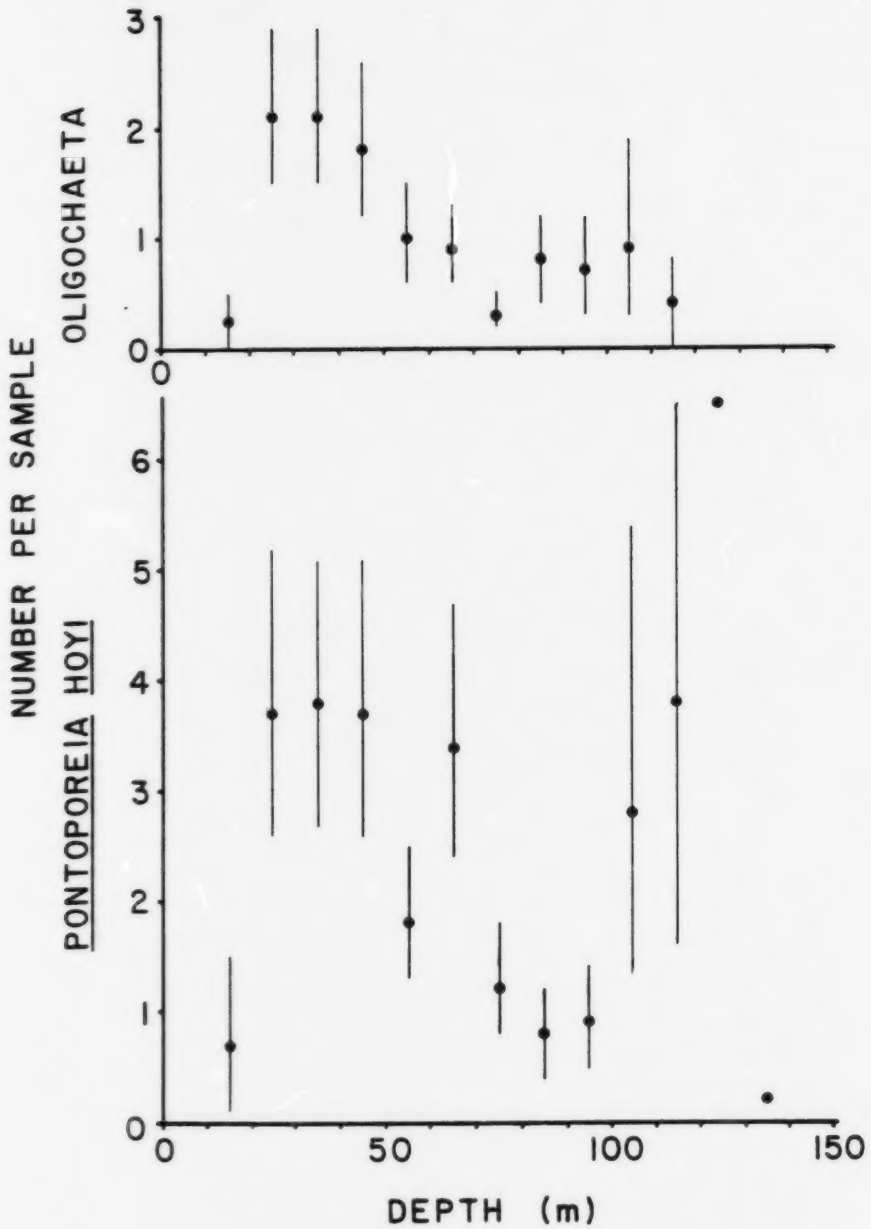

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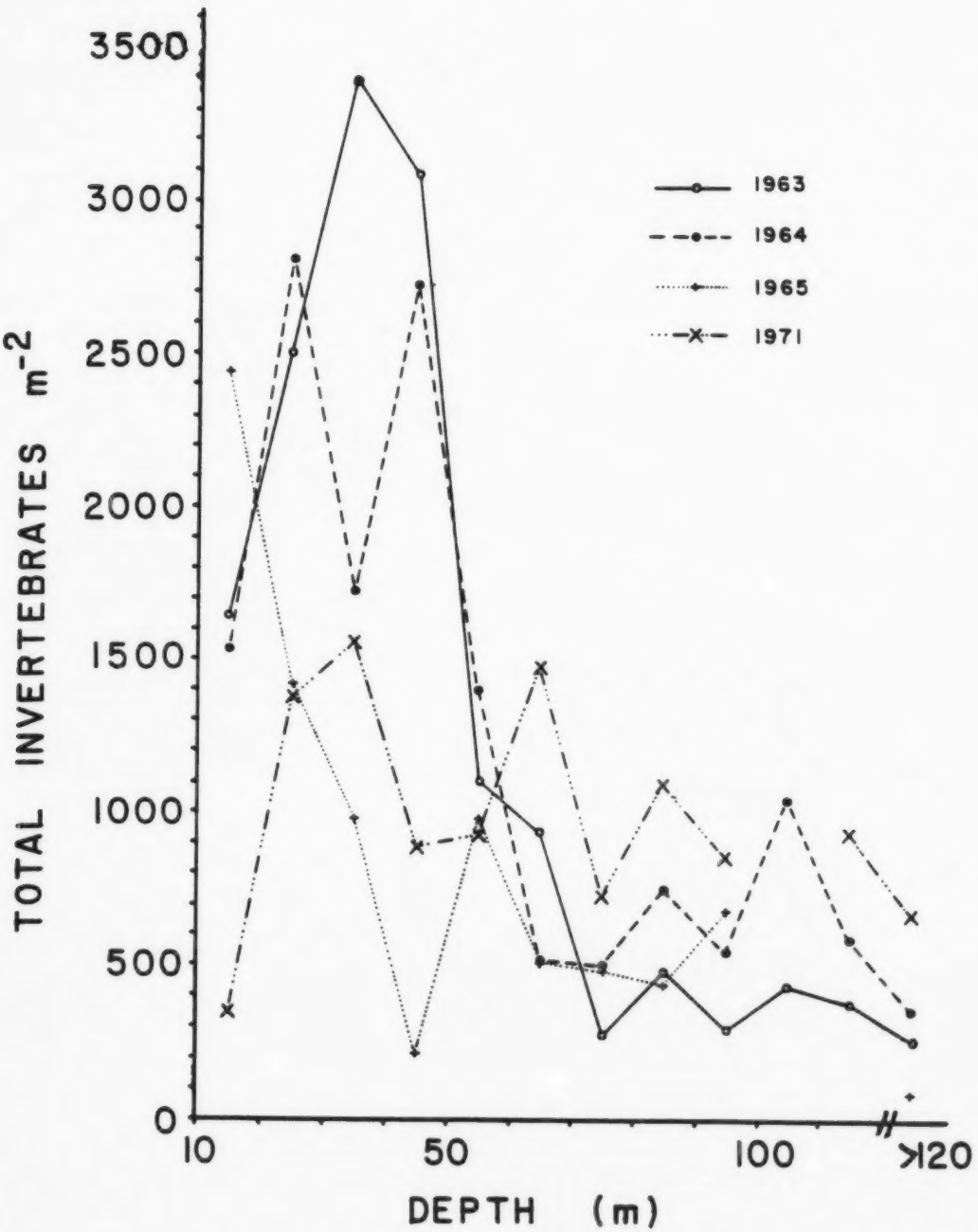

Figure 21. Average total benthic standing stocks at 10m depth intervals in Lake Huron during 1963, 1964 (GLI), 1965 (Schuytema and Powers 1966) and 1971 (Shrivistava 1974).

Appendix A.

Counts of invertebrates (Franklin grab $^{-1}$; approx. 0.028 m^{-2}) of the major taxonomic groups and species listed on the card records of the Great Lakes Institute (GLI) cruises on Lake Huron (H) and Georgian Bay (GB) during 1963 and 1964. Station numbers have been standardized according to the pattern of sampling on cruises H63-2 and GB63-2. Depths in metres.

Types of substrate (SUBS.) are abbreviated as follows: CL = clay, MU = undescribed mud, SI = silt, SA = sand, GA = gravel, PB = pebbles, RO = rock. NS indicates that no sediment sample was obtained, or that station was not visited.

The major groups of invertebrates listed are: OLIGO. = Oligochaeta; P. HOYI = Pontoporeia hoyi; CRUS. = other Crustacea; ie Gammarus, Mysis, Asellus; CHIR. = Chironomidae; PISID. = Pisididae; GASTR. = Gastropoda.

Several of the cruises from Lake Huron and Georgian Bay include the total dry biomass (mg grab $^{-1}$) based on the volume displacement of the animals. These cruises from Georgian Bay are in more detail with m = Mysis; o = Ostracoda; s = Sphaerium; t = Turbellaria; h = Hirudinea.

G. L. I. CRUISE H63-2 : MAY 5 - 7, 1963

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	30	NS	0							
2	70	SA-SI	2	0	1	0	1	0	0	1.5
3	70	SA-SI	10	9	1	0	0	0	0	4.0
4	39	NS	0							
5	75	SI	1	0	1	0	0	0	0	0.8
6	63	SI	0	0	0	0	0	0	0	0
7	111	SA-SI	0	0	0	0	0	0	0	0
8	108	CL	0	0	0	0	0	0	0	0
9	69	SA-SI	1	0	1	0	0	0	0	1.8
10	63	NS	0							
11	68	SA-CL	5	2	2	0	1	0	0	1.6
12	100	SI-SA	1	1	0	0	0	0	0	0.9
13	114	SA	3	2	1	0	0	0	0	2.9
14	86	SA	1	0	1	0	0	0	0	1.8
15	50	GA-SA	8	3	5	0	0	0	0	1.9
16	0	NS	0							
17	118	CL	0	0	0	0	0	0	0	0
18	118	CL	10	4	5	0	1	0	0	1.8
19	128	SA-SI	2	1	1	0	0	0	0	2.8
20	130	SA-SI	1	0	1	0	0	0	0	1.8
21	58	SI-SA	0	0	0	0	0	0	0	0
22	72	SI-SA	2	1	1	0	0	0	0	1.9
23	0	NS	0							
24	47	SI-SA	36	34	2	0	0	0	0	25.5
25	100	CL	0	0	0	0	0	0	0	0
26	0	NS	0							
27	227	SI	1	1	0	0	0	0	0	3.9
28	128	SI	1	0	1	0	0	0	0	2.7
29	58	GA-SA	4	2	1	0	1	0	0	2.5
30	47	NS	0							
31	0	NS	0							
32	0	NS	0							
33	0	NS	0							
34	78	SI-CL	2	0	2	0	0	0	0	2.9
35	57	NS	0							
36	141	CL	2	0	2	0	0	0	0	1.8
37	137	CL	0	0	0	0	0	0	0	0
38	125	SA-CL	1	0	1	0	0	0	0	1.3
999	NO.SAMPLES = 27									

G. L. I. CRUISE H63-5 : JUNE 12 - 22, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	37	SA	51	17	33	0	0	1	0
2	118	NS	0						
3	62	MU-SA	40	9	28	0	3	0	0
4	36	NS	0						
5	90	CL	14	4	10	0	0	0	0
6	63	MU	5	2	3	0	0	0	0
7	95	CL	6	2	4	0	0	0	0
8	103	SA-SI	1	0	1	0	0	0	0
9	68	SI-CL	1	0	1	0	0	0	0
10	70	SA-CL	28	6	22	0	0	0	0
11	63	SA-CL	16	5	11	0	0	0	0
12	126	SI-CL	0	0	0	0	0	0	0
13	132	CL	4	0	4	0	0	0	0
14	100	CL-SA	44	11	29	0	4	0	0
15	52	NS	0						
16	31	SA	34	20	13	0	1	0	0
17	117	NS	0						
18	95	NS	0						
19	125	CL	0	0	0	0	0	0	0
20	112	NS	0						
21	62	MU	57	30	26	0	1	0	0
22	81	CL	3	3	0	0	0	0	0
23	108	NS	0						
24	46	SI-CL	40	25	14	0	1	0	0
25	80	SI-CL	4	0	4	0	0	0	0
26	87	SI-CL	32	6	25	0	1	0	0
27	200	?	9	5	4	0	0	0	0
28	64	NS	0						
29	62	SI-SA	55	40	14	0	0	1	0
30	45	SA	7	7	0	0	0	0	0
31	52	SI-SA	24	5	16	1	0	2	0
32	30	SI-SA	37	22	7	0	5	3	0
33	69	SI-CL	0	0	0	0	0	0	0
34	73	CL	19	12	7	0	0	0	0
35	59	NS	0						
36	126	NS	0						
37	110	CL	0	0	0	0	0	0	0
38	126	CL	3	2	1	0	0	0	0
39	49	SI	15	13	2	0	0	0	0
40	43	CL	0	0	0	0	0	0	0
41	130	SI-CL	13	2	10	0	1	0	0
42	117	NS	0						
43	92	SI-CL	29	3	25	0	1	0	0
44	90	NS	0						
45	65	NS	0						
46	59	CL	1	0	1	0	0	0	0
47	37	SI-SA	39	11	27	0	0	1	0
48	19	SA	53	20	22	1	4	5	1
49	14	NS	0						
50	42	NS	0						
51	28	SI-SA	44	24	11	0	7	2	0
52	62	NS	0						
53	60	MU	1	0	1	0	0	0	0
54	88	SI-CL	1	0	1	0	0	0	0
55	12	NS	0						
56	16	SI-SA	44	16	7	0	7	12	2
57	60	SI-CL	0	0	0	0	0	0	0
58	61	SI-CL	1	0	0	0	1	0	0
59	27	SI-SA	100	53	38	0	4	5	0
60	58	NS	0						
61	25	GA	45	16	22	0	3	3	1
999	NO. SAMPLES = 43								

G. L. I CRUISE H63-7 : JULY 15 - 19, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	29	SA	62	6	54	0	2	0	0	33.0
2	96	SI-CL	0	0	0	0	0	0	0	0
3	52	CL	7	3	3	0	1	0	0	7.2
4	29	CL	4	2	2	0	0	0	0	3.8
5	78	PB-MU	1	0	1	0	0	0	0	0.2
6	63	SI-CL	1	0	1	0	0	0	0	0.8
7	98	CL	4	2	2	0	0	0	0	3.8
8	117	SI	6	2	4	0	0	0	0	1.9
9	76	SI	2	0	2	0	0	0	0	1.8
10	68	SI-CL	6	2	4	0	0	0	0	1.9
11	60	SA-SI	5	2	3	0	0	0	0	1.8
12	120	SI	0	0	0	0	0	0	0	0
13	132	SI-CL	0	0	0	0	0	0	0	0
14	98	SI-CL	15	2	12	0	1	0	0	18.1
15	56	SI-SA	80	18	57	0	2	3	0	68.0
16	38	SA	118	32	71	0	3	12	0	70.5
17	130	SI-CL	7	5	2	0	0	0	0	5.8
18	131	CL	1	0	1	0	0	0	0	1.8
19	160	CL	2	1	1	0	0	0	0	0.2
20	147	SI	12	1	11	0	0	0	0	9.3
21	68	SI-SA	44	25	17	0	1	1	0	47.7
22	75	SI-CL	0	0	0	0	0	0	0	0
23	110	SI-CL	18	0	18	0	0	0	0	27.0
24	46	SI-CL	119	58	56	0	3	2	0	75.6
25	100	SI	8	0	8	0	0	0	0	1.8
26	90	SI-SA	18	0	18	0	0	0	0	18.5
27	209	SI-CL	0	0	0	0	0	0	0	0
28	143	SI-CL	18	7	11	0	0	0	0	18.9
29	72	SI	12	0	12	0	0	0	0	17.0
30	41	SA-SI	62	17	39	0	1	5	0	47.6
31	49	NS	0							
32	29	SA	129	24	69	0	12	23	1	64.0
33	58	SI-SA	14	1	13	0	0	0	0	14.9
34	82	SI	0	0	0	0	0	0	0	0
35	69	SI-CL	41	13	26	0	1	1	0	28.0
36	162	NS	0							
37	137	NS	0							
38	111	SI-CL	0	0	0	0	0	0	0	0
39	50	SI-CL	0	0	0	0	0	0	0	0
40	40	SI	107	20	81	0	1	5	0	103.9
41	130	SI-SA	20	1	18	0	1	0	0	5.6
42	100	SI-CL	7	0	7	0	0	0	0	5.5
43	85	SI-CL	62	38	24	0	0	0	0	67.4
44	72	SA-SI	17	2	15	0	0	0	0	18.7
45	58	SA	40	11	28	1	0	0	0	5.5
46	62	SI-CL	0	0	0	0	0	0	0	0
47	38	SI	102	38	54	0	2	8	0	86.0
48	21	SI-SA	128	67	53	0	3	4	1	75.6
49	18	SA	13	1	8	0	3	0	1	9.3
50	44	SA	55	4	48	0	1	2	0	46.2
51	33	SA	145	40	89	0	3	13	0	95.4
52	63	SI-CL	0	0	0	0	0	0	0	0
53	52	SA-PB	5	0	3	1	1	0	0	5.3
54	79	SI-CL	1	1	0	0	0	0	0	1.9
55	20	NS	0							
56	19	PB-SA	336	7	296	0	10	22	1	113.0
57	69	SI	0	0	0	0	0	0	0	0
58	52	SI	0	0	0	0	0	0	0	0
59	22	SI-SA	89	67	15	0	2	5	0	77.6
60	36	SA	19	6	12	0	0	1	0	1.9
61	29	SI-CL	53	26	23	0	2	1	1	64.7

999 NO. SAMPLES = 57

G.L.I. CRUISE H63-9 : AUG. 13 - 19, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	32	PB-SA-C	165	20	132	0	3	10	0
2	99	SI-CL	14	2	12	0	0	0	0
3	54	SI-CL	1	0	1	0	0	0	0
4	30	NS	0						
5	80	SI-CL	20	3	17	0	0	0	0
6	60	SI	4	3	1	0	0	0	0
7	99	SI-CL	3	0	3	0	0	0	0
8	106	SI-CL	3	1	2	0	0	0	0
9	65	SI-CL	0	0	0	0	0	0	0
10	60	SI-SA	77	25	51	0	0	1	0
11	56	SA-CL	8	4	4	0	0	0	0
12	110	SI-CL	0	0	0	0	0	0	0
13	126	SI	18	4	14	0	0	0	0
14	80	CL	27	13	14	0	0	0	0
15	55	PB-SA-C	73	22	48	0	1	2	0
16	38	SA-CL	206	22	162	0	2	20	0
17	117	GA-SA	7	1	6	0	0	0	0
18	102	SA-CL	40	13	27	0	0	0	0
19	178	SA	0	0	0	0	0	0	0
20	130	SI-CL	15	6	9	0	0	0	0
21	57	SI-CL	71	52	15	0	2	2	0
22	67	SI-CL	0	0	0	0	0	0	0
23	110	NS	0						
24	31	NS	0						
25	83	SI-SA	27	6	21	0	0	0	0
26	131	CL	7	0	7	0	0	0	0
27	160	SI-SA	1	0	1	0	0	0	0
28	159	SA-CL	0	0	0	0	0	0	0
29	73	SA-CL	16	6	10	0	0	0	0
30	40	SA-CL	25	5	16	0	0	4	0
31	50	NS	0						
32	24	SA	82	35	27	0	0	18	2
33	57	SA-CL	112	13	89	0	5	5	0
34	85	SI-CL	14	6	8	0	0	0	0
35	70	SA-SI	8	3	5	0	0	0	0
36	143	SI-CL	17	11	6	0	0	0	0
37	126	CL	25	10	15	0	0	0	0
38	116	NS	0						
39	55	SI	3	3	0	0	0	0	0
40	38	SA	0	0	0	0	0	0	0
41	135	SA-SI	40	17	22	0	1	0	0
42	122	PB-SA-C	15	2	13	0	0	0	0
43	70	PB-SA-C	71	34	31	0	2	3	1
44	70	SI-SA	42	22	17	0	0	3	0
45	63	NS	0						
46	63	NS	0						
47	40	NS	0						
48	26	SI-SA	151	66	62	0	4	16	3
49	18	PB	0	0	0	0	0	0	0
50	45	NS	0						
51	33	PB-SA	102	44	38	0	0	20	0
52	63	SI	1	1	0	0	0	0	0
53	59	PB-SA	119	19	99	0	1	0	0
54	70	SI	4	3	0	0	0	0	1
55	22	PB-SA	2	0	1	0	0	0	1
56	16	SA	74	10	59	0	2	3	0
57	62	SI	1	1	0	0	0	0	0
58	52	SI	2	0	2	0	0	0	0
59	22	GA-SA	55	35	11	5	4	0	0
60	38	SI-SA	138	33	90	1	2	12	0
61	27	GA	103	42	51	0	1	7	2
999	NO.	SAMPLES	= 52						

G.L.I CRUISE H63-12 : SEPT. 16 - 19, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	30	SA-CL	83	14	69	0	0	0	0
2	100	SI-CL	17	2	15	0	0	0	0
3	57	SI-SA	7	5	2	0	0	0	0
4	30	SA-GA	23	9	9	0	3	2	0
5	78	SI-CL	12	0	12	0	0	0	0
6	60	SI-GA	1	0	1	0	0	0	0
7	102	SI-GA	24	6	17	1	0	0	0
8	109	SI-CL	0	0	0	0	0	0	0
9	69	SI-CL	0	0	0	0	0	0	0
10	60	NS	0						
11	68	SI-CL	22	11	11	0	0	0	0
12	107	SI-CL	8	0	8	0	0	0	0
13	115	SI	2	2	0	0	0	0	0
14	92	SI-GA	3	3	0	0	0	0	0
15	52	SA-CL	132	52	76	0	0	4	0
16	39	SI-SA-G	80	5	54	0	0	17	4
17	130	SI-CL	0	0	0	0	0	0	0
18	108	SI-CL	47	13	34	0	0	0	0
19	170	SI-CL	1	0	1	0	0	0	0
20	122	SI-CL	10	1	9	0	0	0	0
21	62	SI-SA	78	15	61	0	0	2	0
22	72	SI-CL	4	0	4	0	0	0	0
23	98	SI	2	0	2	0	0	0	0
24	50	SI-SA	39	23	16	0	0	0	0
25	90	SI-CL	12	4	8	0	0	0	0
26	115	SI-CL	53	14	38	0	1	0	0
27	184	SI-CL	5	0	5	0	0	0	0
28	112	NS	0						
29	60	SA-SI	49	20	27	0	0	2	0
30	42	SI-SA	111	27	80	0	0	4	0
31	50	SA	21	10	9	0	0	2	0
32	28	SI-SA	134	57	54	0	1	22	0
33	58	SI-CL	136	34	97	0	1	4	0
34	81	SI	0	0	0	0	0	0	0
35	60	SI-CL	158	23	132	0	0	3	0
36	141	SI-CL	0	0	0	0	0	0	0
37	126	SI-CL	1	1	0	0	0	0	0
38	138	SA-SI	0	0	0	0	0	0	0
39	50	SI	10	2	7	0	0	1	0
40	39	SA-SI	83	22	59	0	0	2	0
41	133	SI-CL	24	16	8	0	0	0	0
42	97	SI-CL	15	13	2	0	0	0	0
43	59	SA	18	9	8	0	0	1	0
44	88	SI	4	0	4	0	0	0	0
45	58	SI-SA	69	14	55	0	0	0	0
46	60	SI-CL	2	0	2	0	0	0	0
47	38	SI-SA	166	58	90	0	0	18	0
48	20	SI-SA	25	15	10	0	0	0	0
49	18	GA	1	0	0	0	1	0	0
50	45	SI-SA	142	69	69	0	0	4	0
51	31	SI-SA-G	118	61	46	0	0	11	0
52	63	SI	0	0	0	0	0	0	0
53	49	GA	2	1	1	0	0	0	0
54	75	SI	1	0	1	0	0	0	0
55	16	GA-SA	2	0	0	2	0	0	0
56	20	SA	62	5	47	0	4	4	2
57	63	SI	0	0	0	0	0	0	0
58	52	SI	0	0	0	0	0	0	0
59	21	SA	1	1	0	0	0	0	0
60	37	GA	141	61	71	0	0	9	0
61	27	GA-SA	80	46	29	0	2	2	1
999	NO. SAMPLES = 59								

G.L.I. CRUISE H13/14 : OCT. 29 - NOV. 6, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	32	SA	54	9	37	0	3	5	0	27.8
2	100	SI-CL	17	1	16	0	0	0	0	28.0
3	54	SI-SA	158	36	119	0	0	3	0	160.8
4	30	SA	52	9	29	0	7	7	0	26.9
5	76	SI-CL	26	1	25	0	0	0	0	37.2
6	72	SI	1	0	1	0	0	0	0	1.8
7	86	SI-CL	6	2	4	0	0	0	0	9.3
8	104	SA-CL	30	4	26	0	0	0	0	24.3
9	70	CL	5	0	5	0	0	0	0	5.5
10	63	SI-CL	14	6	8	0	0	0	0	19.0
11	56	SI-CL	34	8	26	0	0	0	0	18.2
12	111	SI	7	0	7	0	0	0	0	9.0
13	110	SI-CL	9	0	9	0	0	0	0	13.0
14	85	SI-CL	22	5	17	0	0	0	0	1.9
15	52	GA-MU	97	27	67	0	1	2	0	66.0
16	41	SA-CL	352	53	277	0	0	22	0	246.7
17	110	SA-CL	19	2	17	0	0	0	0	27.9
18	118	SI-CL	0	0	0	0	0	0	0	0
19	138	SI-CL	0	0	0	0	0	0	0	0
20	112	SI-CL	14	3	11	0	0	0	0	18.7
21	57	SI-SA	77	21	52	0	0	4	0	76.0
22	74	SI	1	0	1	0	0	0	0	1.8
23	100	SI	1	0	1	0	0	0	0	1.8
24	48	SA-CL	39	12	27	0	0	0	0	43.2
25	78	SI-CL	0	0	0	0	0	0	0	0
26	112	SI-CL	1	1	0	0	0	0	0	2.0
27	162	SA-CL	13	1	12	0	0	0	0	9.3
28	139	SI-CL	0	0	0	0	0	0	0	0
29	62	SI-CL	2	1	1	0	0	0	0	3.7
30	42	SI-SA	134	40	81	0	0	13	0	192.5
31	50	SA-SI	28	9	19	0	0	0	0	28.2
32	28	SI-GA	105	16	73	1	0	13	2	74.9
33	64	SA-CL	52	23	29	0	0	0	0	47.7
34	79	SI	0	0	0	0	0	0	0	0
35	58	SA-CL	40	3	33	0	0	4	0	42.2
36	134	SA-CL	13	11	2	0	0	0	0	5.8
37	131	SI-CL	0	0	0	0	0	0	0	0
38	173	NS	0							
39	52	SI	0	0	0	0	0	0	0	0
40	38	SA-CL	19	4	11	0	0	4	0	15.6
41	108	SI-SA	7	4	3	0	0	0	0	1.9
42	154	PB-CL	0	0	0	0	0	0	0	0
43	45	PB-CL	18	7	11	0	0	0	0	18.8
44	81	SI	5	0	5	0	0	0	0	13.0
45	61	SI-CL	5	1	4	0	0	0	0	14.9
46	66	SI-CL	0	0	0	0	0	0	0	0
47	39	SA	118	16	95	0	1	6	0	113.0
48	20	SA	32	15	10	1	1	4	1	23.5
49	15	SA	9	4	0	3	0	0	2	17.7
50	40	SI-SA	165	75	80	0	1	9	0	124.9
51	32	SA	24	10	11	0	0	3	0	19.5
52	66	SI	10	6	4	0	0	0	0	15.1
53	79	NS	0							
54	75	SI	0	0	0	0	0	0	0	0
55	16	SI-GA	1	0	0	1 *	0	0	0	284.2
56	1	NS	0							
57	1	NS	0							
58	1	NS	0							
59	1	NS	0							
60	61	SI	23	0	22	1	0	0	0	23.2
61	40	SA	139	46	86	0	0	7	0	143.5
999	NO. SAMPLE = 55			* = crayfish.						

G.L.I. CRUISE H64-1 : APRIL 29 - MAY 2, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	60	NS	0							
2	99	SI-CL	6	3	2	0	1	0	0	1.7
3	57	CL	30	30	0	0	0	0	0	15.7
4	28	SI-SA	3	1	0	0	1	1	0	0.6
5	78	SI	4	0	4	0	0	0	0	1.8
6	62	SI	3	2	1	0	0	0	0	1.9
7	105	SI-CL	0	0	0	0	0	0	0	0
8	110	SI-CL	1	0	1	0	0	0	0	0.9
9	68	SI-CL	2	0	2	0	0	0	0	1.6
10	60	SI-CL	15	12	0	0	3	0	0	5.8
11	53	SI-CL	10	8	0	0	2	0	0	1.7
12	109	SI-CL	3	2	1	0	0	0	0	1.9
13	112	SI-CL	8	1	5	0	2	0	0	8.1
14	87	SI-CL	20	20	0	0	0	0	0	9.8
15	54	SI-GA	124	47	71	0	3	3	0	66.0
16	45	SI-SA	97	21	56	0	5	15	0	47.3
17	117	SI-CL	2	2	0	0	0	0	0	1.1
18	120	SI-CL	11	6	5	0	0	0	0	36.4
19	140	SI-CL	0	0	0	0	0	0	0	0
20	118	SI-CL	1	1	0	0	0	0	0	1.0
21	58	SI	34	14	13	0	1	6	0	19.4
22	73	SI	4	3	1	0	0	0	0	3.2
23	99	SI	0	0	0	0	0	0	0	0
24	50	SI-CL	55	15	38	0	2	0	0	55.6
25	90	SI	48	6	40	0	2	0	0	44.3
26	85	SI-SA	101	48	52	0	1	0	0	53.2
27	193	SI-CL	20	18	2	0	0	0	0	17.6
28	116	SI-CL	42	22	20	0	0	0	0	22.5
29	60	SI-SA	79	48	30	0	0	1	0	57.9
30	42	SI-SA	146	42	101	0	1	2	0	62.0
31	49	SI-SA	34	9	23	0	1	1	0	16.8
32	30	SA	148	38	73	1	4	28	4	90.0
33	63	SI-CL	17	12	5	0	0	0	0	15.5
34	57	SA-CL	16	4	12	0	0	0	0	7.6
35	77	SI-CL	67	17	50	0	0	0	0	71.7
36	136	SI-CL	1	0	0	1	0	0	0	1.9
37	140	SI-CL	1	0	1	0	0	0	0	1.8
38	154	SI	1	0	1	0	0	0	0	1.8
39	55	SI	3	3	0	0	0	0	0	2.0
40	47	SI-CL	13	4	4	0	1	4	0	9.6
41	135	NS	0							
42	64	NS	0							
43	95	SI	7	6	1	0	0	0	0	9.7
44	42	SA	142	31	90	0	1	20	0	106.2
45	58	SI-SA	70	25	38	0	1	6	0	37.8
46	61	SI	1	0	1	0	0	0	0	1.8
47	38	SA	84	41	39	0	0	4	0	92.6
48	20	SA-SI	101	67	9	0	17	8	0	51.0
49	18	GA	0	0	0	0	0	0	0	0
50	46	SA	50	26	18	0	1	5	0	29.0
51	31	SA	43	26	5	0	6	6	0	14.7
52	62	SI-CL	4	3	1	0	0	0	0	3.8
53	62	SA-CL	4	1	3	0	0	0	0	1.9
54	80	SI	2	2	0	0	0	0	0	1.9
55	16	PB-SA	6	4	0	0	0	2	0	4.5
56	18	SI	86	7	47	0	11	16	5	59.6
57	62	SI	0	0	0	0	0	0	0	0
58	52	SI	1	1	0	0	0	0	0	1.9
59	22	SI	7	3	1	0	3	0	0	8.8
60	38	SA	31	18	11	0	1	1	0	26.6
61	27	SA	62	21	22	0	2	12	5	45.0
999	NO.	SAMPLES	= 58							

G.L.I. CRUISE H64-4 : JUNE 8 - 11, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	30	SA	55	18	27	0	2	8	0
2	99	SI-CL	15	3	12	0	0	0	0
3	1	NS	0						
4	27	GA-CL	4	0	2	1	0	0	1
5	75	SI-CL	6	0	6	0	0	0	0
6	60	SI-CL	0	0	0	0	0	0	0
7	103	SI-CL	1	1	0	0	0	0	0
8	110	SI-CL	8	4	4	0	0	0	0
9	72	SI-CL	0	0	0	0	0	0	0
10	58	CL	75	42	30	0	1	2	0
11	56	SI-CL	46	25	19	0	0	2	0
12	105	SI-CL	0	0	0	0	0	0	0
13	120	SI	0	0	0	0	0	0	0
14	93	SI-CL	36	17	19	0	0	0	0
15	51	SA-CL	108	20	77	0	3	8	0
16	48	SA-CL	42	20	20	0	0	2	0
17	123	SI-CL	10	8	2	0	0	0	0
18	103	CL	62	21	41	0	0	0	0
19	155	SI-CL	1	0	1	0	0	0	0
20	134	SI	22	5	17	0	0	0	0
21	60	SI-SA	35	13	20	0	0	2	0
22	72	SI-CL	6	5	1	0	0	0	0
23	100	SI	12	5	7	0	0	0	0
24	49	SI-CL	22	19	3	0	0	0	0
25	75	SA-CL	15	4	7	0	4	0	0
26	149	NS	0						
27	213	NS	0						
28	165	CL	2	1	1	0	0	0	0
29	60	CL	28	12	15	0	1	0	0
30	41	SI	210	18	158	0	3	31	0
31	49	SA	97	25	70	1	0	1	0
32	30	SA	192	67	70	0	5	48	2
33	55	CL	104	48	48	0	1	7	0
34	81	SI-CL	3	1	2	0	0	0	0
35	53	SA	8	0	7	0	0	1	0
36	143	CL	3	1	2	0	0	0	0
37	133	CL	1	1	0	0	0	0	0
38	121	CL	4	2	2	0	0	0	0
39	53	SI	11	3	7	0	0	1	0
40	48	SA-SI	260	61	142	0	18	39	0
41	1	NS	0						
42	137	CL	26	25	1	0	0	0	0
43	68	SI-SA	73	29	39	0	0	5	0
44	75	SI-SA	40	13	20	0	2	5	0
45	59	SA	18	10	8	0	0	0	0
46	63	SI	1	0	1	0	0	0	0
47	38	SI-SA	59	15	33	0	0	11	0
48	19	SI-SA	93	67	14	0	2	8	2
49	18	GA	24	15	0	0	9	0	0
50	48	SA-SI	144	78	58	0	4	4	0
51	30	SA	11	5	0	0	3	3	0
52	65	SI-CL	0	0	0	0	0	0	0
53	49	SA-GA	10	0	10	0	0	0	0
54	73	SI-CL	2	2	0	0	0	0	0
55	16	CL	1	0	1	0	0	0	0
56	17	SA	166	13	92	0	18	40	3
57	66	SI	0	0	0	0	0	0	0
58	55	SI	0	0	0	0	0	0	0
59	25	SA-GA	23	20	1	0	0	2	0
60	37	GA	27	26	0	0	0	1	0
61	30	SA-SI	146	32	91	0	5	15	3
999	NO. SAMPLES = 58								

G.L.I. CRUISE H64-6 : JULY 6 - 10, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	1	NS	0							
2	101	SI-CL	8	2	6	0	0	0	0	5.6
3	54	SI-CL	6	6	0	0	0	0	0	2.0
4	30	SA	109	25	42	0	2	39	1	53.7
5	72	CL	24	11	12	0	1	0	0	16.8
6	62	SI-CL	2	0	2	0	0	0	0	1.9
7	89	SI-CL	14	8	5	0	1	0	0	10.4
8	108	SI-CL	0	0	0	0	0	0	0	0
9	71	SI-CL	0	0	0	0	0	0	0	0
10	61	SI-CL	42	24	15	0	2	1	0	36.5
11	39	SA-SI-G	6	5	1	0	0	0	0	1.9
12	105	SI-CL	55	0	55	0	0	0	0	70.3
13	117	SI-CL	4	4	0	0	0	0	0	1.9
14	93	SI-CL	62	27	34	0	1	0	0	37.8
15	49	SA-SI	89	30	47	0	2	10	0	51.0
16	39	SI-CL	76	14	48	0	1	13	0	44.5
17	116	SI-CL	8	7	1	0	0	0	0	3.9
18	116	SI-CL	21	20	1	0	0	0	0	9.8
19	165	SI	14	0	14	0	0	0	0	24.0
20	125	SI-CL	33	7	25	0	1	0	0	35.1
21	60	SI-CL	62	26	32	0	1	3	0	28.6
22	72	SI	8	8	0	0	0	0	0	5.9
23	102	SI-CL	1	0	1	0	0	0	0	1.8
24	47	SI-CL	30	30	0	0	0	0	0	19.7
25	76	SI-CL	12	2	10	0	0	0	0	14.0
26	91	SA-SI	67	25	38	0	4	0	0	29.4
27	191	SI-CL	3	1	2	0	0	0	0	1.9
28	108	SI-CL	21	18	3	0	0	0	0	5.7
29	63	SI-CL	49	47	2	0	0	0	0	27.4
30	40	SA-SI	35	1	27	0	0	7	0	29.1
31	49	SA-SI	215	60	140	1	5	9	0	112.4
32	31	SA-CL	155	67	55	0	3	28	2	77.4
33	48	SI-SA	22	11	9	0	1	1	0	11.3
34	74	SI-CL	13	12	1	0	0	0	0	9.7
35	51	SA	18	0	17	0	0	1	0	11.1
36	146	SI-CL	1	0	1	0	0	0	0	1.0
37	110	SI-CL	14	8	6	0	0	0	0	11.5
38	165	SI-CL	0	0	0	0	0	0	0	0
39	57	SI-CL	3	3	0	0	0	0	0	2.0
40	47	SI-SA	187	65	88	0	17	17	0	92.0
41	140	SI-CL	8	8	0	0	0	0	0	9.8
42	125	SI-CL	54	24	28	0	1	1	0	20.7
43	78	SI-SA	42	11	28	1	1	1	0	31.1
44	86	SI-CL	40	14	24	0	0	2	0	44.1
45	58	SI-CL	12	1	9	1	0	1	0	15.1
46	63	SI	0	0	0	0	0	0	0	0
47	39	SA	46	14	23	0	1	8	0	26.9
48	20	SA	53	11	32	0	0	10	0	19.5
49	16	SA	11	1	0	0	4	0	6	2.0
50	46	SA	25	19	4	0	1	1	0	15.3
51	30	SA-GA	18	13	4	0	0	1	0	7.8
52	66	SI	2	1	1	0	0	0	0	1.9
53	45	SA-CL	17	8	9	0	0	0	0	15.2
54	76	SI-CL	1	0	0	0	0	1	0	0.2
55	17	GA	15	5	1	0	5	0	4	6.7
56	19	SI-SA	37	1	24	0	3	5	4	27.8
57	63	SI-CL	1	1	0	0	0	0	0	1.9
58	55	SI	3	1	0	0	0	0	2	0.6
59	27	SA-SI	152	60	66	0	5	17	4	67.2
60	37	SA-CL	116	34	58	0	1	18	5	98.8
61	27	SI-CL	103	57	36	0	3	4	3	85.2
999	NO.	SAMPLES	= 60							

G.L.I. CRUISE H64-8 : AUG. 17 - 20, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	27	SI-CL	17	7	8	0	0	2	0
2	100	SI-CL	7	2	5	0	0	0	0
3	56	CL	1	0	1	0	0	0	0
4	28	GA-SA	0	0	0	0	0	0	0
5	75	SI	2	1	1	0	0	0	0
6	70	SI-CL	4	2	2	0	0	0	0
7	1	NS	0						
8	122	SI-CL	0	0	0	0	0	0	0
9	67	SI-CL	0	0	0	0	0	0	0
10	60	SI-CL	9	6	2	0	1	0	0
11	50	CL	52	24	27	0	0	1	0
12	108	SI	0	0	0	0	0	0	0
13	117	SI-CL	3	2	1	0	0	0	0
14	90	SI-CL	22	16	6	0	0	0	0
15	49	SA-CL	81	34	38	0	1	8	0
16	45	SA-CL	187	27	145	0	0	15	0
17	111	CL	3	2	1	0	0	0	0
18	106	SI-CL	21	13	8	0	0	0	0
19	134	SI-CL	1	1	0	0	0	0	0
20	121	SI-CL	3	1	2	0	0	0	0
21	57	SI-CL	57	18	37	0	1	1	0
22	68	SI	1	1	0	0	0	0	0
23	97	SI	0	0	0	0	0	0	0
24	49	SI-CL	29	26	2	0	1	0	0
25	85	SI	30	11	19	0	0	0	0
26	96	SA-CL	113	44	66	0	1	2	0
27	189	SI	13	12	1	0	0	0	0
28	104	SI-CL	7	3	3	0	1	0	0
29	57	SI-CL	46	33	12	0	0	1	0
30	40	GA-CL	4	2	2	0	0	0	0
31	49	SA-CL	30	4	24	0	1	1	0
32	30	SA-CL	152	33	96	0	0	22	1
33	61	SA-CL	55	9	45	0	1	0	0
34	73	SI-CL	4	4	0	0	0	0	0
35	29	SA-GA	0	0	0	0	0	0	0
36	160	SI-CL	8	5	3	0	0	0	0
37	140	SI-CL	1	0	1	0	0	0	0
38	107	SI-CL	4	1	3	0	0	0	0
39	54	SI-CL	12	8	4	0	0	0	0
40	50	SA-CL	95	16	71	0	2	6	0
41	131	SI-CL	13	8	5	0	0	0	0
42	90	SI-CL	26	26	0	0	0	0	0
43	56	SA-CL	21	11	8	0	0	2	0
44	87	SI	0	0	0	0	0	0	0
45	57	GA	34	17	15	0	2	0	0
46	63	SI	1	0	0	0	0	1	0
47	37	SI	38	1	25	0	0	12	0
48	20	SI-SA	44	17	22	0	0	5	0
49	16	GA-CL	2	1	0	0	1	0	0
50	45	SA-SI	96	35	45	0	3	13	0
51	25	SA	13	10	3	0	0	0	0
52	61	SI	4	4	0	0	0	0	0
53	53	SA-CL	65	10	54	0	0	1	0
54	73	SI	2	1	1	0	0	0	0
55	15	GA	5	1	0	0	4	0	0
56	17	SA	23	0	17	1	3	2	0
57	67	SI	0	0	0	0	0	0	0
58	52	SI	0	0	0	0	0	0	0
59	21	SI-SA	59	55	2	0	2	0	0
60	36	SA-CL	18	0	17	0	1	0	0
61	26	SA-CL	58	25	19	3	0	9	2
999	NO. SAMPLES = 60								

G.L.I. CRUISE H64-10 : NOV 16 - 20, 1964

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.
1	0	NS	0						
2	0	NS	0						
43	60	SA-CL	94	26	47	0	0	21	0
44	1	NS	0						
45	60	SI-SA	9	0	7	0	2	0	0
46	62	SI-CL	2	1	0	1	0	0	0
47	42	SA-CL	127	40	78	0	1	8	0
48	1	NS	0						
49	15	SA	9	6	0	0	3	0	0
50	1	NS	0						
51	33	SA	37	12	14	0	4	7	0
52	64	SI-CL	0	0	0	0	0	0	0
53	55	SA-CL	0	0	0	0	0	0	0
54	79	SI-CL	0	0	0	0	0	0	0
55	16	GA	0	0	0	0	0	0	0
56	1	NS	0						
57	1	NS	0						
58	1	NS	0						
59	25	SA-CL	32	29	0	2	0	1	0
60	40	GA	36	15	16	0	2	3	0
61	28	SI-CL	69	32	21	5	2	5	4
999	NO. SAMPLES = 13								

G. L. I. CRUISE H64-11 : NOV 24 - 27, 1964

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	BIOMASS
1	36	SA-CL	25	9	12	0	2	2	0	14.7
2	102	SA-CL	2	0	2	0	0	0	0	9.0
3	59	CL	11	9	2	0	0	0	0	11.6
4	27	SA	19	8	6	0	2	3	0	13.0
5	78	SI-CL	5	1	4	0	0	0	0	9.3
6	67	GA-SI	0	0	0	0	0	0	0	0
7	105	GA	0	0	0	0	0	0	0	0
8	110	SI-CL	2	0	2	0	0	0	0	1.8
9	1	NS	0							
10	1	NS	0							
11	1	NS	0							
12	1	NS	0							
13	1	NS	0							
14	1	NS	0							
15	1	NS	0							
16	1	NS	0							
17	126	SI	0	0	0	0	0	0	0	0
18	121	SA-CL	50	36	14	0	0	0	0	29.0
19	146	SA-CL	8	3	5	0	0	0	0	13.3
20	136	SI-CL	9	4	5	0	0	0	0	9.4
21	62	CL	46	22	24	0	0	0	0	44.0
22	80	SI-CL	6	3	3	0	0	0	0	9.3
23	105	SI-CL	0	0	0	0	0	0	0	0
24	50	SA-CL	128	67	58	0	3	0	0	107.9
25	90	SI-CL	1	1	0	0	0	0	0	0.8
26	135	SI-CL	2	1	1	0	0	0	0	2.4
27	200	SI-CL	30	20	10	0	0	0	0	25.0
28	148	SA-CL	7	3	4	0	0	0	0	7.5
29	62	GA-CL	73	32	38	0	2	1	0	69.7
30	43	SA	66	20	43	0	0	3	0	49.7
31	1	NS	0							
32	22	SA	30	21	3	0	4	0	2	23.8
33	62	GA	79	30	47	0	2	0	0	56.2
34	78	SI-CL	5	4	1	0	0	0	0	3.9
35	39	SA-CL	5	3	2	0	0	0	0	3.8
36	165	SI-CL	20	12	8	0	0	0	0	25.0
37	145	SI-CL	16	10	6	0	0	0	0	17.0
38	112	SI-CL	10	3	7	0	0	0	0	20.0
39	52	SI-CL	6	3	3	0	0	0	0	8.0
40	41	CL	112	68	39	0	4	0	1	86.2
41	146	NS	0							
42	105	NS	0							
43	62	SA-CL	100	18	79	0	0	3	0	56.7
44	82	SI-CL	11	8	3	0	0	0	0	17.2
45	64	SA-CL	77	32	43	0	2	0	0	62.0
46	63	SI	8	2	5	1	0	0	0	9.4
47	42	SA	10	0	10	0	0	0	0	5.5
48	21	SI-SA	53	32	14	2	1	2	2	62.4
49	17	NS	0							
50	45	SA	86	18	62	0	0	6	0	38.2
51	28	GA	3	1	2	0	0	0	0	3.7
52	64	SI-CL	13	11	2	0	0	0	0	13.6
53	55	SA-CL	87	33	52	0	1	1	0	70.0
54	79	SI-CL	2	2	0	0	0	0	0	1.7
55	16	GA	1	0	0	0	0	0	1	3.6
56	18	SA-CL	78	5	46	2	10	14	1	57.4
57	65	SI	0	0	0	0	0	0	0	0
58	52	SI	0	0	0	0	0	0	0	0
59	17	SA-GA	3	0	0	0	1	1	1	1.1
60	1	NS	0							
61	1	NS	0							
999	NO. SAMPLES = 47									
END CRUISE										

G.L.I. CRUISE GB63-2: MAY 1 - 4, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.BOYI	CRUS.	CHIR.	PISID.	GASTR.	MEM.	BIOMASS
1	51	SA	0	0	0	0	0	0	0	0	0
2	42	SA-SI	0	0	0	0	0	0	0	0	0
3	60	SA-CL	1	0	1	0	0	0	0	0	1.9
4	72	SA	2	0	1	0	0	0	0	1t	3.9
5	1	NS	0								
6	37	MU	17	5	8	0	2	0	1	1	5.3
7	97	MU	0	0	0	0	0	0	0	0	0
8	64	GA	0	0	0	0	0	0	0	0	0
9	73	SA	0	0	0	0	0	0	0	0	0
10	38	RO	1	0	0	0	0	0	0	1	0.2
11	42	SA	0	0	0	0	0	0	0	0	0
12	1	NS	0								
13	1	NS	0								
14	1	NS	0								
15	1	NS	0								
16	1	NS	0								
17	86	SI-CL	1	0	0	1	0	0	0	0	0.3
18	85	SI	7	1	6	0	0	0	0	0	3.8
19	80	MU	1	0	0	1	0	0	0	0	0.4
20	1	NS	0								
21	84	SI-CL	3	2	1	0	0	0	0	0	2.9
22	76	SA	0	0	0	0	0	0	0	0	0
23	74	SA-CL	3	0	3	0	0	0	0	0	3.7
24	36	SA	2	1	1	0	0	0	0	0	2.9
25	1	NS	0								
26	27	SA-GA-CL	14	5	8	0	0	1s	1	0	13.9
27	33	GA-CL	0	0	0	0	0	0	0	0	0
28	67	CL	13	6	3	0	4	0	0	0	4.1
29	1	NS	0								
30	1	NS	0								
31	74	SA	3	1	2	0	0	0	0	0	1.4
32	107	MU	0	0	0	0	0	0	0	0	0
33	115	MU	5	2	2	0	1	0	0	0	1.7
34	1	NS	0								
35	92	MU	0	0	0	0	0	0	0	0	0
36	74	CL	0	0	0	0	0	0	0	0	0
37	56	CL	9	5	4	0	0	0	0	0	2.9
38	49	SI	3	1	2	0	0	0	0	0	2.8
39	34	SA	10	3	5	0	2	0	0	0	5.1
40	35	PB-SA	0	0	0	0	0	0	0	0	0
41	26	PB-SA	20	12	7	0	1	0	0	0	9.7
42	32	SA-SI	5	4	0	0	1	0	0	0	2.6
43	25	PB-CL	12	3	6	0	1	0	0	2	2.5
44	1	NS	0								
45	56	SI-RO	0	0	0	0	0	0	0	0	0
46	1	NS	0								
47	70	SI	1	1	0	0	0	0	0	0	1.0
48	89	SI	0	0	0	0	0	0	0	0	0
49	89	SI	1	0	0	0	1	0	0	0	0.4
50	57	SA-SI	0	0	0	0	0	0	0	0	0
999	NO. SAMPLES = 37										

G.L.I. CRUISE GB63-4 : SEPT 10 - 11, 1963.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	NEM.	BIOMASS
1	55	SI	16	1	13	0	1	1	0	0	8.9
2	36	SI	3	2	1	0	0	0	0	0	2.0
3	61	SI	6	2	3	0	1	0	0	0	5.4
4	68	SI-CL	3	1	1	0	1	0	0	0	4.8
5	50	SA-CL	13	3	9	0	1	0	0	1	8.1
6	30	SI-SA	2	0	1	0	1	0	0	0	0.5
7	77	SI	1	0	1	0	0	0	0	0	1.9
8	70	SI-CL	2	0	1	0	1	0	0	1	0.8
9	78	SI-CL	2	0	2	0	0	0	0	0	2.8
10	46	SA-CL	51	6	38	1m	0	6	0	1	47.4
11	54	SI	3	0	3	0	0	0	0	0	1.9
12	1	NS	0								
13	61	SI	2	0	2	0	0	0	0	0	5.6
14	73	SI-CL	9	0	8	1m	0	0	0	0	9.3
15	1	NS	0								
16	60	GA-SA-MU	25	20	5	0	0	0	0	1	9.6
17	74	SA-SI	1	0	1	0	0	0	0	0	1.9
18	92	SI-CL	4	0	4	0	0	0	0	1	1.6
19	93	SA-SI	1	0	1	0	0	0	0	0	2.8
20	104	SI	4	0	4	0	0	0	0	0	5.6
21	89	CL	0	0	0	0	0	0	0	0	0
22	80	SI-CL	0	0	0	0	0	0	0	0	0
23	70	SA-SI	16	2	14	0	0	0	0	0	18.8
24	45	SA-CL	54	12	42	0	0	0	0	0	46.8
25	20	GA-RO	4	1	0	0	1	0	1	1	1.4
26	32	CL	65	11	53	0	0	1	0	0	45.3
27	58	SI	0	0	0	0	0	0	0	0	0
28	51	MU	29	5	24	0	0	0	0	0	28.2
29	67	SI	0	0	0	0	0	0	0	0	0
30	91	SI-CL	3	2	1	0	0	0	0	0	2.9
31	91	MU	0	0	0	0	0	0	0	0	0
32	119	SA-CL	11	0	11	0	0	0	0	0	9.3
33	112	SI	0	0	0	0	0	0	0	0	0
34	139	SI-CL	0	0	0	0	0	0	0	0	0
35	100	CL	0	0	0	0	0	0	0	0	0
36	76	SI-CL	0	0	0	0	0	0	0	0	0
37	62	SI-CL	0	0	0	0	0	0	0	0	0
38	42	SI-CL	22	1	21	0	0	0	0	0	17.8
39	38	SI-CL	16	2	14	0	0	0	0	0	9.4
40	42	CL	0	0	0	0	0	0	0	0	0
41	18	SA	62	6	46	0	5	5	0	1	29.4
42	30	MU	7	3	4	0	0	0	0	0	9.4
43	28	SA-CL	44	3	41	0	0	0	0	0	48.5
44	27	CL	0	0	0	0	0	0	0	0	0
45	38	SI-SA	4	0	4	0	0	0	0	0	9.3
46	48	SI-SA	33	14	19	0	0	0	0	0	28.3
47	79	MU	0	0	0	0	0	0	0	0	0
48	90	SI	0	0	0	0	0	0	0	0	0
49	1	NS	0								
50	96	SI	0	0	0	0	0	0	0	0	0
999	NO. SAMPLES = 47										

G.L.I CRUISE GB64-4 : MAY 2 - 5, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.BOYI	CRUS.	CHIR.	PISID.	GASTR.
1	50	SI	0	0	0	0	0	0	0
2	40	SI	21	14	6	0	0	0	1
3	65	SI	5	1	1	0	3	0	0
4	72	SI	0	0	0	0	0	0	0
5	40	SI	3	1	0	0	2	0	0
6	34	FB-SA-SI	32	18	6	0	8	0	0
7	81	SI	0	0	0	0	0	0	0
8	71	SI-CL	20	1	18	0	1	0	0
9	73	SI-CL	0	0	0	0	0	0	0
10	51	SI-SA	30	14	11	0	3	2	0
11	50	SI	0	0	0	0	0	0	0
12	50	SI	1	0	1	0	0	0	0
13	53	SI-CL	8	6	1	0	0	1	0
14	72	SI	1	0	0	0	1	0	0
15	62	SI-CL	17	8	9	0	0	0	0
16	60	SI-CL	40	20	20	0	0	0	0
17	100	SI-CL	9	0	9	0	0	0	0
18	93	SI-CL	1	0	0	0	1	0	0
19	90	SI-CL	1	0	0	1	0	0	0
20	108	SI	0	0	0	0	0	0	0
21	90	SI	0	0	0	0	0	0	0
22	85	SI	1	1	0	0	0	0	0
23	70	SI-CL	43	8	34	0	0	1	0
24	48	SA-CL	44	25	8	0	1	10	0
25	26	SI-SA	6	3	1	0	0	2	0
26	33	SI-CL	43	14	21	0	2	6	0
27	57	GA-CL	4	4	0	0	0	0	0
28	55	SI-CL	24	5	18	0	1	0	0
29	72	SI-CL	0	0	0	0	0	0	0
30	89	SI	3	3	0	0	0	0	0
31	92	SI-CL	0	0	0	0	0	0	0
32	113	CL	4	0	4	0	0	0	0
33	1	NS	0						
34	138	SI	0	0	0	0	0	0	0
35	99	SI	0	0	0	0	0	0	0
36	70	SI-CL	12	1	11	0	0	0	0
37	60	CL	2	1	1	0	0	0	0
38	30	SI-SA	8	6	1	0	1	0	0
39	38	SI-CL	1	1	0	0	0	0	0
40	40	SI	0	0	0	0	0	0	0
41	19	SA	0	0	0	0	0	0	0
42	1	NS	0						
43	24	GA-SA-CL	0	0	0	0	0	0	0
44	24	SI-SA-RO	39	22	15	0	2	0	0
45	45	MU	4	1	2	0	1	0	0
46	48	SI	34	22	10	0	2	0	0
47	74	SI	0	0	0	0	0	0	0
48	88	SI	0	0	0	0	0	0	0
49	96	SI	2	1	1	0	0	0	0
50	99	SA-SI	68	36	27	1	3	1	0
51	26	SI-CL	9	1	5	0	3	0	0
52	25	SI	1	0	1	0	0	0	0
53	28	SI	0	0	0	0	0	0	0
54	15	CL	0	0	0	0	0	0	0
999	NO. SAMPLES = 52								

G.L.I CRUISE GB64-7 : JUNE 22 - 24, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.BOTI	CRUS.	CHIR.	PISID.	GASTR.
1	52	SI	0	0	0	0	0	0	0
2	36	SI	18	4	10	0	1	3	0
3	63	SI	10	6	3	0	0	1	0
4	73	SI	1	0	0	1	0	0	0
5	38	RO	0	0	0	0	0	0	0
6	30	SA-GA	2	0	0	0	1	1	0
7	80	CL	1	0	1	0	0	0	0
8	76	CL	28	1	19	0	6	2	0
9	71	SI	0	0	0	0	0	0	0
10	54	SI	3	1	2	0	0	0	0
11	55	SI	0	0	0	0	0	0	0
12	48	SI	0	0	0	0	0	0	0
13	54	SI	0	0	0	0	0	0	0
14	68	SI-CL	0	0	0	0	0	0	0
15	73	SI-CL	3	1	2	0	0	0	0
16	64	SI-SA	2	1	1	0	0	0	0
17	25	MU	13	0	13	0	0	0	0
18	96	SI	0	0	0	0	0	0	0
19	95	CL	6	0	6	0	0	0	0
20	110	SI	12	5	7	0	0	0	0
21	87	SI	1	0	1	0	0	0	0
22	83	SI	3	0	3	0	0	0	0
23	65	CL	13	2	11	0	0	0	0
24	40	CL	57	36	18	0	1	2	0
25	1	NS	0						
26	38	CL	28	7	18	0	1	2	0
27	43	CL	15	4	10	0	1	0	0
28	52	CL	31	16	12	0	3	0	0
29	70	SI-CL	2	0	2	0	0	0	0
30	93	SI	3	1	2	0	0	0	0
31	90	SI-CL	2	1	0	0	1	0	0
32	125	SI-CL	0	0	0	0	0	0	0
33	116	SI-CL	1	0	1	0	0	0	0
34	145	SI	0	0	0	0	0	0	0
35	1	NS	0						
36	1	NS	0						
37	54	SI	0	0	0	0	0	0	0
38	43	SI	30	2	24	0	2	2	0
39	36	SI	3	2	1	0	0	0	0
40	38	CL	8	1	7	0	0	0	0
41	28	CL	14	6	3	0	5	0	0
42	24	SI-CL	61	17	40	1	2	1	0
43	25	MU	12	2	8	0	1	1	0
44	25	CL	22	12	3	0	2	4	1
45	40	SI	2	1	1	0	0	0	0
46	1	NS	0						
47	75	SI	0	0	0	0	0	0	0
48	92	SI	1	1	0	0	0	0	0
49	97	SI	2	2	0	0	0	0	0
50	84	CL	43	27	10	0	6	0	0
999	NO. SAMPLES = 46								

G.L.I CRUISE GB64-8 : JULY 23 - 27, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.BOTI	CRUS.	CHIR.	PISID.	GASTR.
1	51	SI-CL	0	0	0	0	0	0	0
2	38	SI-CL	2	2	0	0	0	0	0
3	60	SI	3	0	3	0	0	0	0
4	67	SI	4	0	4	0	0	0	0
5	40	SI-SA	6	1	3	0	2	0	0
6	32	SI-SA	11	5	2	2	1	1	0
7	77	SI-CL	0	0	0	0	0	0	0
8	68	SA-SI	4	0	3	0	1	0	0
9	73	SI-CL	1	1	0	0	0	0	0
10	41	SI-SA	10	4	4	1	1	0	0
11	49	SI	4	0	4	0	0	0	0
12	53	SI	3	0	3	0	0	0	0
13	54	SI	0	0	0	0	0	0	0
14	70	SI-CL	0	0	0	0	0	0	0
15	71	SI-CL	1	0	1	0	0	0	0
16	58	SI-CL	2	0	2	0	0	0	0
17	85	CL	0	0	0	0	0	0	0
18	90	SI-CL	0	0	0	0	0	0	0
19	81	CL	0	0	0	0	0	0	0
20	102	SI-CL	9	1	7	0	0	1	0
21	86	CL	0	0	0	0	0	0	0
22	84	SI-CL	0	0	0	0	0	0	0
23	70	CL	10	2	8	0	0	0	0
24	40	SA-CL	13	7	6	0	0	0	0
25	24	SA-GA	29	10	12	0	1	6	0
26	37	CL	21	13	6	0	0	2	0
27	56	SI	0	0	0	0	0	0	0
28	46	SI-CL	12	2	9	0	1	0	0
29	76	SI-CL	0	0	0	0	0	0	0
30	86	SI	14	9	5	0	0	0	0
31	96	SI-CL	0	0	0	0	0	0	0
32	111	CL	8	3	5	0	0	0	0
33	1	NS	0						
34	137	SI	1	0	1	0	0	0	0
35	95	CL	0	0	0	0	0	0	0
36	75	SI-CL	0	0	0	0	0	0	0
37	50	SA-CL	2	1	1	0	0	0	0
38	40	CL	15	0	13	0	2	0	0
39	36	CL	8	0	7	0	1	0	0
40	40	SI-CL	2	0	2	0	0	0	0
41	24	MU	26	0	12	6	3	5	0
42	1	NS	0						
43	26	CL	23	7	11	0	2	3	0
44	23	CL	54	20	31	1	2	0	0
45	43	SI-CL	0	0	0	0	0	0	0
46	44	SI	55	33	21	0	1	0	0
47	68	SI-CL	0	0	0	0	0	0	0
48	87	SI-CL	0	0	0	0	0	0	0
49	90	SI-CL	0	0	0	0	0	0	0
50	79	SA	39	12	26	0	0	1	0
51	26	SI-CL	5	5	0	0	0	0	0
52	29	SI	4	2	2	0	0	0	0
53	28	SI	0	0	0	0	0	0	0
54	17	SI	0	0	0	0	0	0	0
999	NO.	SAMPLES	- 52						

G.L.I CRUISE GB64-9 : AUG 20 - 23, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOTI	CRUS.	CHIR.	PISID.	GASTR.
1	53	SI	0	0	0	0	0	0	0
2	39	SI	1	0	1	0	0	0	0
3	61	SI	17	1	16	0	0	0	0
4	61	SI	7	1	6	0	0	0	0
5	36	SA-CL	1	0	0	0	1	0	0
6	32	MU	0	0	0	0	0	0	0
7	78	SI	1	0	1	0	0	0	0
8	62	SI-SA	17	0	15	0	0	2	0
9	72	SI-CL	2	0	2	0	0	0	0
10	42	SI-SA	3	0	2	0	0	1	0
11	52	SI	1	0	1	0	0	0	0
12	48	SI	0	0	0	0	0	0	0
13	56	SI	2	0	2	0	0	0	0
14	61	CL	6	4	1	0	1	0	0
15	67	CL	4	0	4	0	0	0	0
16	61	CL	6	0	6	0	0	0	0
17	80	SA-SI	1	0	1	0	0	0	0
18	87	SI-CL	1	0	1	0	0	0	0
19	86	CL	4	1	3	0	0	0	0
20	102	SI	3	1	2	0	0	0	0
21	88	SI	3	0	3	0	0	0	0
22	75	CL	1	0	1	0	0	0	0
23	62	CL	7	0	7	0	0	0	0
24	38	GA-CL	13	3	4	4	1	1	0
25	17	GA-CL	17	1	3	11	1	0	1
26	32	CL	66	18	47	0	0	1	0
27	52	SI-CL	11	2	9	0	0	0	0
28	45	CL	18	10	7	0	1	0	0
29	66	CL	2	0	2	0	0	0	0
30	87	SI	2	2	0	0	0	0	0
31	87	CL	0	0	0	0	0	0	0
32	116	SI-SA	16	0	16	0	0	0	0
33	1	NS	0						
34	144	SI	0	0	0	0	0	0	0
35	93	SI-CL	1	1	0	0	0	0	0
36	76	SI	5	2	1	1	1	0	0
37	61	SI-CL	0	0	0	0	0	0	0
38	43	CL	14	13	0	0	1	0	0
39	39	SI-CL	0	0	0	0	0	0	0
40	50	SI	0	0	0	0	0	0	0
41	26	SI-SA	31	2	23	0	4	2	0
42	1	NS	0						
43	25	SA-CL	88	12	65	1	9	1	0
44	25	CL	46	21	23	0	1	1	0
45	39	SI	0	0	0	0	0	0	0
46	46	SI-CL	89	63	26	0	0	0	0
47	76	SI	1	0	1	0	0	0	0
48	90	SI-CL	0	0	0	0	0	0	0
49	94	SI	2	1	1	0	0	0	0
50	82	SA	47	20	23	0	0	4	0
51	25	CL	8	0	8	0	0	0	0
52	28	SI	0	0	0	0	0	0	0
53	27	SI	0	0	0	0	0	0	0
54	17	SI-CL	0	0	0	0	0	0	0
999	NO. SAMPLES = 52								

G.L.I CRUISE GM64-10 : SEPT. 25 - 30, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	MEM.	BIOMASS
1	55	SI	11	3	7	0	0	1	0	0	11.5
2	40	SI	2	2	0	0	0	0	0	0	5.0
3	63	SI	23	2	21	0	0	0	0	0	118.9
4	72	SI	37	0	33	2m,o	0	2	0	0	33.8
5	32	SA-CL	6	0	3	0	2	1	0	0	1.6
6	34	SA-CL	26	5	8	3o	9	1	0	0	8.4
7	77	SI-SA	3	0	2	0	0	0	0	1	1.5
8	70	CL	25	1	24	0	0	0	0	0	24.2
9	75	SI-CL	21	0	19	0	0	0	0	2	19.8
10	41	SA	0	0	0	0	0	0	0	0	0
11	60	SI	4	0	3	0	0	0	0	1	12.6
12	49	SI	1	0	1	0	0	0	0	0	2.0
13	49	SI	9	2	7	0	0	0	0	0	9.2
14	75	SA-SI	25	1	23	0	0	1	0	3	21.4
15	75	SA-SI	0	0	0	0	0	0	0	0	0
16	1	NS	0								
17	83	CL	2	0	2	0	0	0	0	0	2.0
18	91	CL	21	15	3	0	0	0	0	3	18.9
19	84	CL	6	3	3	0	0	0	0	0	3.8
20	105	SI	32	1	29	1m	0	1	0	0	14.9
21	90	CL	0	0	0	0	0	0	0	0	0
22	80	SI	5	0	5	0	0	0	0	0	3.8
23	65	CL	24	3	21	0	0	0	0	0	13.1
24	46	CL	14	7	7	0	0	0	0	0	13.4
25	1	NS	0								
26	34	SA-CL	65	11	48	0	3	2	0	1	43.2
27	56	CL	2	0	2	0	0	0	0	0	2.0
28	76	SI	7	4	3	0	0	0	0	0	11.5
29	64	CL	1	0	1	0	0	0	0	0	0.9
30	87	CL	3	2	1	0	0	0	0	0	3.8
31	90	CL	0	0	0	0	0	0	0	0	0
32	118	CL	24	0	24	0	0	0	0	0	18.6
33	1	NS	0								
34	136	SI	0	0	0	0	0	0	0	0	0
35	93	SI-CL	3	1	2	0	0	0	0	0	3.7
36	76	SI	7	7	0	0	0	0	0	0	7.9
37	55	CL	7	3	2	0	0	0	0	2	3.6
38	39	CL	46	33	8	2o	1	2	0	2	33.5
39	35	SA-CL	11	4	6	0	1	0	0	0	3.5
40	33	SA-SI	24	8	14	0	0	2	0	0	32.1
41	20	SA-CL	3	1	0	0	3	0	1	1h	1.0
42	1	NS	0								
43	26	SI-SA	49	8	37	0	0	3	0	1	24.4
44	27	CL	90	20	63	0	4	2	0	1	71.7
45	46	SI	5	0	5	0	0	0	0	0	3.7
46	36	SA-SI	32	12	20	0	0	0	0	1	37.6
47	1	NS	0								
48	1	NS	0								
49	1	NS	0								
50	63	SA-SI	96	18	70	1m	1	5	0	1	56.3
51	24	CL	28	16	12	0	0	0	0	1h	38.4
52	26	SI	0	0	0	0	0	0	0	0	0
53	26	SI	0	0	0	0	0	0	0	0	0
54	16	SI-CL	1	0	1	0	0	0	0	0	1.5
999	NO. SAMPLES = 47										

G.L.I CRUISE GB64-11 : NOV. 27 - DEC 1, 1964.

STN	DEPTH	SUBS.	TOTAL	OLIGO.	P.HOYI	CRUS.	CHIR.	PISID.	GASTR.	NEM.	BIOMASS
43	28	MU	10	5	4	0	1	0	0	0	3.4
44	27	MU	0	0	0	0	0	0	0	0	0
45	45	SI-CL	2	1	1	0	0	0	0	0	3.7
46	46	CL	10	5	5	0	0	0	0	0	13.5
47	78	SI	0	0	0	0	0	0	0	0	0
48	93	SI-CL	1	0	1	0	0	0	0	0	0.1
49	103	SI	0	0	0	0	0	0	0	0	0
50	88	SA-CL	67	39	26	0	2	0	0	0	60.2
51	26	SA-CL	20	9	11	0	0	0	0	0	24.7
52	30	SI	7	5	2	0	0	0	0	0	8.9
53	29	SI	0	0	0	0	0	0	0	0	0
54	17	SI-CL	0	0	0	0	0	0	0	0	0

I

999 NO. SAMPLE = 12

END CRUISE

Appendix B. Counts of the commonest species of Oligochaeta and Chironomidae in samples from GLI cruises on Lake Huron during 1963 and 1964.
X = station not sampled; ? = missing vial.

STYLODRILUS HERINGIANUS

YEAR	1963						1964					
CRUISE	2	5	7	9	12	13/14	1	4	6	8	10	11
MONTH	5	6	7	8	9	10 11	4	6	7	8	10	10
STATION												
1	X	16	5	13	9	8	X	18	X	4	X	9
2	0	X	0	2	42	1	3	3	2	1	X	0
3	6	8	3	0	?	36	9	0	6	0	X	6
4	X	X	2	X	?	6	0	0	22	0	X	4
5	0	4	0	5	0	1	0	0	6	1	X	1
6	0	1	0	3	4	0	2	0	0	0	X	0
7	0	0	2	0	6	2	0	1	4	X	X	0
8	0	0	2	1	0	1	0	4	0	0	X	0
9	0	0	0	0	1	0	0	0	0	0	X	X
10	X	6	2	25	X	6	9	?	15	6	X	X
11	3	4	2	3	40	5	8	25	2	23	X	X
12	1	0	0	0	49	0	2	0	0	0	X	X
13	2	0	0	4	?	0	1	0	5	2	X	X
14	0	11	2	7	5	4	20	?	17	12	X	X
15	2	X	15	22	46	20	47	20	22	19	X	X
16	X	21	23	0	?	?	21	20	11	?	X	X
17	0	X	4	1	13	4	1	8	6	3	X	0
18	3	X	0	10	?	0	6	?	19	5	X	36
19	1	0	1	0	8	0	0	0	0	2	X	2
20	0	X	1	5	13	3	?	4	3	1	X	2
21	0	31	22	42	12	21	8	?	20	18	X	10
22	0	1	0	0	11	0	3	1	7	1	X	2
23	X	X	0	X	0	0	0	3	0	0	X	0
24	44	25	46	X	?	16	15	?	22	26	X	67
25	0	0	0	2	1	0	2	3	2	11	X	?
26	X	4	0	0	?	1	48	X	19	44	X	1
27	1	5	0	0	0	1	18	X	1	11	X	8
28	0	X	6	0	X	0	18	1	8	3	X	1
29	1	37	0	6	20	1	48	12	44	33	X	1
30	X	8	12	4	51	2	42	18	1	3	X	20
31	X	4	X	X	10	3	5	25	36	4	X	X
32	X	?	16	14	57	15	35	7	56	33	X	20
33	X	0	1	2	19	23	12	48	9	9	X	30
34	0	11	0	?	0	0	0	?	10	4	X	4
35	X	X	11	3	?	1	17	0	0	0	X	2
36	0	X	X	6	8	8	0	1	0	5	X	12
37	0	0	X	10	4	0	0	0	7	0	X	6
38	0	?	0	X	21	X	0	2	0	0	X	3
39	X	0	0	0	?	0	2	0	0	0	X	0
40	X	0	6	0	?	5	5	61	41	21	X	65
41	X	2	0	13	15	4	X	X	8	6	X	X
42	X	2	0	2	1	0	X	24	19	26	X	X
43	X	3	26	34	?	5	7	37	7	?	?	18
44	X	X	?	20	11	0	31	13	9	0	X	8
45	X	x	8	X	?	0	1	10	?	?	0	32
46	X	0	0	X	2	0	0	0	0	0	0	1
47	X	13	18	X	57	7	15	13	9	0	4	0
48	X	9	8	6	3	8	3	4	5	3	X	2
49	X	X	0	0	2	1	0	2	0	0	0	X
50	X	X	0	X	?	8	26	0	17	35	0	0
51	X	17	6	35	10	9	13	?	6	4	0	1
52	X	X	0	?	0	7	1	0	1	3	0	8
53	X	0	0	19	?	X	1	0	24	10	0	33
54	X	0	0	?	0	0	0	0	0	0	0	0
55	X	X	X	0	6	0	3	0	8	1	X	0
56	X	14	3	7	?	X	6	13	1	0	X	0
57	X	0	0	0	0	6	0	0	0	0	X	0
58	X	0	0	0	0	7	0	0	1	0	0	0
59	X	14	8	4	5	X	0	8	27	0	0	0
60	X	X	6	33	0	0	14	26	29	0	12	X
61	X	0	4	42	10	14	6	10	21	4	2	X

SPIROSPERMA FEROX

YEAR	1963							1964					
CRUISE	2	5	7	9	12	13/14		1	4	6	8	10	11
MONTH	5	6	7	8	9	10	11	4	6	7	8	10	10
STATION													
1	X	1	0	0	30	1		X	0	X	0	X	0
2	0	X	0	0	3	0		0	0	0	0	X	0
3	0	0	0	0	1	0		0	0	0	0	X	0
4	X	X	0	X	?	0		0	0	0	0	X	0
5	0	0	0	0	0	0		0	0	0	0	X	0
6	0	0	0	0	0	0		0	0	0	0	X	0
7	0	2	0	0	0	0		0	0	3	X	X	0
8	0	0	0	0	0	0		0	0	0	0	X	0
9	0	0	0	0	0	0		0	0	0	0	X	X
10	X	0	0	0	X	0		1	?	1	0	X	X
11	0	1	0	1	5	1		0	0	0	1	X	X
12	0	0	0	0	8	0		0	0	0	0	X	X
13	0	0	0	0	?	0		0	0	0	0	X	X
14	0	0	0	0	3	0		0	?	0	0	X	X
15	0	X	0	0	6	0		0	0	1	0	X	X
16	X	0	0	0	?	?		0	0	0	?	X	X
17	0	X	0	0	1	0		0	0	0	0	X	0
18	0	X	0	1	?	0		0	?	0	0	X	0
19	0	0	0	0	0	0		0	0	0	0	X	0
20	0	X	0	0	0	0		1	0	0	0	X	0
21	0	0	5	0	0	0		0	?	0	0	X	?
22	0	0	0	0	0	0		0	0	0	0	X	0
23	X	X	0	X	0	0		0	0	0	0	X	0
24	0	0	1	X	?	1		0	?	0	0	X	0
25	0	0	0	0	0	0		0	0	0	0	X	?
26	X	1	0	0	?	0		0	X	0	0	X	0
27	0	0	0	0	1	0		0	X	0	0	X	0
28	0	X	0	0	X	0		4	0	1	0	X	0
29	1	1	0	0	0	0		0	0	0	1	X	1
30	X	0	1	0	0	0		0	0	0	0	X	0
31	X	0	X	X	0	1		0	1	1	0	X	X
32	X	1	2	1	0	1		3	0	1	1	X	1
33	X	0	0	0	0	0		0	2	0	0	X	0
34	0	1	0	?	0	0		0	?	0	0	X	0
35	X	X	0	0	?	0		2	0	0	0	X	0
36	0	X	X	0	0	0		0	0	0	0	X	0
37	0	0	X	0	0	0		0	0	0	0	X	0
38	0	?	0	X	0	X		0	0	0	0	X	0
39	X	0	0	0	0	0		0	0	0	0	X	0
40	X	0	0	0	?	0		0	0	3	0	X	0
41	X	0	1	0	1	0		X	X	0	0	X	X
42	X	0	0	0	0	0		X	1	1	0	X	X
43	X	0	0	0	?	0		0	0	0	0	?	?
44	X	X	?	0	0	0		4	0	1	0	0	0
45	X	X	1	X	?	0		1	0	0	?	?	0
46	X	0	0	X	0	0		0	0	0	0	0	0
47	X	0	7	X	1	5		7	2	1	1	13	0
48	X	7	21	35	0	2		38	42	3	11	X	9
49	X	1	0	0	0	0		0	7	0	1	4	X
50	X	X	2	X	?	31		1	3	2	8	0	2
51	X	3	3	9	1	2		2	?	4	6	0	0
52	X	X	0	?	0	0		0	0	0	0	0	0
53	X	0	0	0	?	0		0	0	0	0	0	0
54	X	0	0	?	0	0		0	0	0	0	0	0
55	X	X	X	0	0	0		0	0	0	0	X	0
56	X	0	0	0	?	X		0	0	0	0	X	0
57	X	0	0	0	0	1		0	0	0	0	X	0
58	X	0	0	0	0	X		0	0	0	0	0	0
59	X	32	49	28	0	X		4	12	17	33	28	0
60	X	X	0	3	0	0		3	0	2	0	3	X
61	X	0	13	29	2	1		9	6	27	13	16	X

HETEROTRISSOCLADIUS OLIVERI

YEAR	1963						1964					
CRUISE	2	5	7	9	12	13/14	1	4	6	8	10	11
MONTH	5	6	7	8	9	10 11	4	6	7	8	10	10
STATION												
1	X	0	2	2	0	3	X	0	X	0	X	1
2	1	X	0	0	0	0	0	0	0	0	X	0
3	0	1	0	0	0	0	0	0	0	0	X	0
4	X	X	0	X	?	5	1	0	1	0	X	1
5	0	0	0	0	0	0	0	0	0	0	X	0
6	0	0	0	0	0	0	0	0	0	0	X	0
7	0	0	0	0	0	0	0	0	1	X	X	0
8	0	0	0	0	0	0	0	0	0	0	X	0
9	0	0	0	0	0	0	0	0	0	0	X	X
10	X	0	0	0	X	0	1	?	0	0	X	X
11	1	0	0	0	0	0	0	0	0	1	X	X
12	0	0	0	0	0	0	0	0	0	0	X	X
13	0	0	0	0	?	0	0	0	0	0	X	X
14	0	4	1	0	0	0	0	?	1	0	X	X
15	0	X	1	0	0	0	0	0	2	0	X	X
16	X	1	1	3	?	?	0	0	1	?	X	X
17	0	X	0	0	0	0	0	0	0	0	X	0
18	1	X	0	0	?	0	0	?	0	0	X	0
19	0	0	0	0	0	0	0	0	0	0	X	0
20	0	X	0	0	0	0	?	0	1	0	X	0
21	0	1	1	2	0	0	0	?	1	0	X	0
22	0	0	0	0	0	0	0	0	0	0	X	0
23	X	X	0	X	0	0	0	0	0	0	X	0
24	0	1	3	X	?	0	0	?	0	0	X	3
25	0	0	0	0	0	0	0	1	0	0	X	?
26	X	1	0	0	?	0	0	X	4	0	X	0
27	0	0	0	0	0	0	0	X	0	0	X	0
28	0	X	0	0	X	0	0	0	0	0	X	0
29	2	0	0	0	0	0	0	0	0	0	X	2
30	X	0	0	0	0	0	0	0	0	0	X	0
31	X	0	X	X	0	0	1	0	4	0	X	X
32	0	3	7	0	0	0	0	3	3	0	X	0
33	X	0	0	5	0	0	0	1	0	0	X	2
34	0	0	0	?	0	0	0	?	0	0	X	0
35	X	X	1	0	?	0	0	0	0	0	X	0
36	0	X	X	0	1	0	0	0	0	0	X	0
37	0	0	X	0	0	0	0	0	0	0	X	0
38	0	?	0	X	0	X	0	0	0	0	X	0
39	X	0	0	0	?	0	0	0	0	0	X	0
40	X	0	1	0	?	0	0	0	17	0	X	0
41	X	1	3	1	0	0	X	X	0	0	X	X
42	X	0	0	0	0	0	X	0	1	0	X	X
43	X	1	0	1	?	0	0	0	1	?	?	0
44	X	X	?	0	0	0	2	0	0	0	X	0
45	X	X	0	X	?	0	0	0	?	?	0	2
46	X	0	0	X	0	0	0	0	0	0	0	0
47	X	0	2	X	0	1	0	0	1	0	1	0
48	X	3	0	0	0	0	0	0	0	0	X	0
49	X	X	0	0	0	0	0	0	0	3	0	X
50	X	X	0	X	?	1	0	0	0	0	0	0
51	X	3	3	0	0	0	0	?	0	0	1	0
52	X	X	0	?	0	0	0	0	0	0	0	0
53	X	0	0	1	?	X	0	0	0	0	0	1
54	X	0	?	0	0	0	0	0	0	0	0	0
55	X	X	X	0	0	0	0	0	0	0	X	0
56	X	0	0	1	?	X	0	0	0	0	X	0
57	X	0	0	0	0	0	0	0	1	0	X	0
58	X	0	0	0	1	0	0	0	0	0	0	0
59	X	3	0	3	0	X	0	0	1	0	0	0
60	X	X	0	2	0	0	0	0	1	0	1	X
61	X	2	1	0	0	0	0	0	1	0	3	X